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THE PATHOLOGY AND TREATMENT OF WAR WOUNDS

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IN the treatment of a wound the surgeon's duty is first to protect the patient's life and limb, and second to secure return of function to the maximum degree in the shortest possible time. Success in saving life and limb depends on his ability to assist the natural processes of the body to prevent invasive infection in the critical early days of the injury; early and complete return of function depends on his ability to assist the healing process, which can only come into play effectively when infection has been obviated or overcome.

In civilian work the surgeon can at times combine these two functions by doing excision and primary suture, but in military surgery conditions are so favourable for infection that these two aspects of treatment must almost invariably be separated. The primary treatment of the wound, designed to combat infection, must be accomplished in so far as is compatible with that function in a manner which will leave a favourable field for the healing process. This may be left to continue as secondary healing, or in the great majority of cases may be accelerated and made more efficient by a timely secondary suture or skin graft. An examination of the pathological features of these two periods in the history of a wound will indicate the principles on which treatment should be based.

PATHOLOGY

The first phase commences at the time of injury and is a phase of reaction to trauma. The features of this reaction as they occur in the common type of contaminated penetrating war wound will be described. The wound is contaminated with pathogenic organisms, there is severely injured tissue which is dead or dying, and the living tissue in immediate proximity to the wound is reacting to the injury by the process of inflammation. This involves capillary dilatation and exudation of plasma; the result is swelling. The wound has a narrow entrance which with swelling becomes obstructed; the exudate is trapped in the wound and in the tissue; the fascial sheath of the limb is relatively inelastic so that with further swelling tension mounts, lymphatic and venous obstruction occurs; there is further exudation and more swelling, so that the end result is a spreading area of œdema and congestion. While this has been occurring the contaminating organisms have multiplied, have invaded the dead and dying tissue and then are able to further invade the living tissue which is now wet with œdema and handicapped by impaired circulation. The situation resembles closely that existing in the bowel wall above an intestinal obstruction; as it becomes congested and œdematous it becomes vulnerable to invasion by organisms. In the wound it is the presence of contaminating organisms and dead tissue which determines the occurrence of infection; it is the type of infection and the amount of circulatory embarrassment which determine the eventual extent to which infection will spread unless interrupted by treatment. Anaerobes particularly will find a favourable medium in congested muscle.

That is the sequence of events in the untreated wound, and it points the way to correct surgical treatment. As far as it is possible to do so, contaminating organisms should be dealt with by removal of visible dirt and foreign material, and by removal of the dead tissue which is their culture medium. Decompression of the wound will prevent the spreading œdema which gives them their opportunity to invade. By decompression is meant draining it widely so that exudate may flow freely into and out of the wound. The excision of dead tissue is an important part of the decompression, as a layer of devitalized tissue acts as a seal to trap exudate in the living tissue; its removal allows exudate to flow into the wound. From the exudate there is deposited on the cut surface

of the tissue a layer of fibrin, and as part of the treatment the tissues should be put at rest so that this layer of fibrin may remain intact. Under these conditions any organisms which have escaped removal and remain in the wound find unfavourable conditions. If they are few, they may succumb to the bactericidal effect of the exudate; if they survive they are confronted by an effective barrier of fibrin backed by tissue of high vitality. They are unable to invade. It will be noted that the method of treatment described by Trueta is exactly designed to provide these ideal conditions.

There is no sharp distinction between the exudative phase and the healing phase. Exudation decreases steadily after the first few hours, and by the end of a week the wound may be considered to be "stabilized", in that œdema is gone, circulation is efficient, the layer of fibrin is being vascularized to form early granulation tissue and the fate of any contaminating organisms is decided. Many of the cases which received adequate primary treatment before infection had become established will be sterile. In others, a few organisms will have survived and can be revealed by cultures from the wound, but have been unable to multiply sufficiently to provoke a purulent reaction. A third small group will be frankly infected. These are chiefly cases in which treatment has been incomplete by reasons of technical error or because of the presence of tissue, such as bare bone, which had impaired blood supply but for anatomical reasons could not be removed. It is this small group which produces foul plasters.

Those wounds which are sterile will remain clean indefinitely if left alone. However, once the period of exudation is over the moist granulating surface becomes extremely vulnerable to superficial infection; even though the first change of dressing is done with care the wound is likely to become infected and if repeated dressings are done, infection is certain. The result of such secondary infection is œdema, hypertrophy of the granulation tissue and more or less purulent discharge; there is seldom any constitutional reaction but healing is delayed and scar increased. Because this degree of infection may postpone and eventually prevent secondary suture, wounds which are suitable for this procedure should never be examined or dressed unnecessarily. The most favourable period for secondary suture is between the 6th and 10th days, *i.e.*, after the wound is stabilized and before the tissues have become fixed by early scar. When possible, the first examination of a treated wound should be made in this period. It should be done in the operating room and if the wound appears clean secondary suture should be done at once.

Some of the wounds closed will fall into the second group mentioned above; they will appear clean but will contain a few organisms. After closure these may cause a local reaction and there may be some purulent discharge between the sutures, or the reaction may be more acute, necessitating cutting the sutures. That is the essence of the superiority of secondary over primary suture: if a contaminated wound is closed by primary suture, the organisms may invade the vulnerable surrounding tissues to threaten limb or even life; in the case of secondary suture, because of the effectiveness of the granulation tissue barrier and the excellent state of the circulation, the infection remains local, and at worst the sutures can be cut and nothing further is lost.

TECHNIQUE OF TREATMENT

Primary wound treatment.—The general principles of primary wound treatment, *i.e.*, free incision of skin and fascia, excision of damaged tissue, removal of foreign material, light packing and immobilization are well known and agreed to almost unanimously. It is surprising how differently those principles can be interpreted by different surgeons.

Working at a base hospital it soon becomes apparent that there are certain common errors. The sign of the inexperienced surgeon is overenthusiastic excision of the skin and superficial tissues with imperfect excision of the depth of the wound. The sign of the experienced surgeon is adequate incision, little if any excision of skin, careful excision of devitalized muscle, removal of large foreign bodies and loose fragments of bone, and in deep wounds adequate counter drainage. In the former case the plaster is removed at the base to drain an abscess, to perform secondary wound toilet or at times to amputate a limb. In the latter case the plaster is removed to suture a clinically clean wound.

The writings of civilian surgeons to the contrary, there is no place in war surgery for

excision of wounds "en bloc". In deep penetrating wounds and in large wounds it is not possible to do so, and in any case there can be no justification for excision of any tissue, and above all skin, merely because it is lacerated and exposed. There are only two indications for sacrifice of tissue; serious damage to its blood supply, or impregnation with dirt which cannot otherwise be removed.

The surgical attack on the wound is primarily incision. The direction of the incision is determined by anatomical considerations, the length by two considerations; first, that exposure must be adequate to permit accurate visualization of all parts of the wound, and, second, that decompression must be adequate. If at the finish of the operation the length of the wound is greater than is required for free drainage it may be partially closed.

In reference to the question of exposure it may be noted that the only difficulty in primary wound treatment is in keeping anatomically orientated. Main vessels and nerve trunks may be encountered from an unfamiliar approach and unless expected and recognized irreparable damage may be done. The safeguards are a knowledge of anatomy and mental visualization of all important structures in their relationship to the wound.

The wound is packed to keep it slightly open and so permit decompression. Plain, dry, close mesh gauze bandage seems to be the best wick, but the nature of the packing is much less important than how it is used. The wound must be packed very lightly. If it is plugged tightly (as it very commonly is) the packing has the opposite effect to that intended and may be the cause of spreading œdema and infection.

Compound fractures and deep wounds involving muscle should be enclosed in plaster, following the general principle of immobilizing the joint above and the joint below. If decompression of the wound has been adequate there will be no swelling, because the exudate flows out of the wound to stain the plaster instead of collecting in the tissues. Conversely, if swelling occurs treatment has been inadequate; the plaster should be removed and the wound investigated. Supervision during evacuation of casualties cannot be close so that in all cases treated in forward surgical units, the plasters should be padded and split.

In this war, in which the common wounds are those caused by splinters of mortar bomb, H.E. shell, grenade or aerial bomb, multiple wounds are frequent. A decision must be made whether a given penetrating wound requires surgical treatment or is better left alone. Aside from wounds of an area like the abdomen or head where injury to an important deep structure determines operative treatment, this is decided by examining the wound and examining the limb. If the skin wound is small and slit-like with no loss of skin and the limb is not tense, the fragment has cut its way into the body, has done little damage to tissue and is very unlikely to have carried in a piece of cloth; this wound may be left alone. If, on the other hand, the wound is irregular and gaping and the fragment has struck the skin on the flat, bursting its way through the tissues, it will have caused severe tissue damage and is likely to have carried in a piece of cloth. This wound must be operated on; if in addition the limb is tense, operation is urgent.

At operation on this type of case there must be no thoughtless excision of skin, which will result in a chronic ulcer. There must be adequate incision and careful excision of damaged muscle. If the foreign body is sizeable the track of damaged tissue will lead to it, and it, with the piece of battle dress so frequently adherent will be removed. If it is smaller and the muscle damage in the depths is not easily perceptible, so that the track is lost, the foreign body can be ignored.

In the case of through and through wounds the same criteria are applied to the wound and to the limb. If operation is indicated the track must be thoroughly explored, so that damaged tissue and foreign material are found and removed. To simply cut out an area of good skin at each wound does not obviate danger but does complicate healing. An incised wound, even a large one, which remains clean and can be closed by secondary suture results in no permanent disability, whereas a small penetrating wound involving muscle which becomes chronically infected results in severe disability from scarring and fixation of muscle.

In war, under certain conditions, one is faced with the problem of treating large numbers of late cases, wounds which are many hours or several days old. It must be decided whether wound toilet as described above will be done,

or simply abscesses drained and limbs amputated as indications arise. There is no question which is the correct course. The same principles which are effective in limiting and aborting incipient infection are also effective as treatment of established infection. Free drainage is required to allow the escape of purulent exudate and, more important, to restore efficient circulation by decompression of the tissues. Dead tissue is a focus where organisms can flourish unhampered by the effect of the body's defenses or chemotherapeutic agents, and will remain so until separated by the slow process of sloughing. It should be excised. Support will improve circulation, and rest will minimize absorption of toxins and assist in the localization of infection.

Secondary suture.—In this paper the term "secondary suture" indicates suture at any time subsequent to primary wound treatment. The term "delayed primary suture" seems to be a needless complication of terminology. An excellent and very detailed description of the technique of secondary suture as practised in the Canadian Army has been provided by Sarjeant and Morton.[4]

Success is directly proportional to the degree of care and attention to detail that is used in doing the suture. The closure of even the smallest wound must be a formal procedure, with adequate skin preparation and draping. As pointed out above, the most favourable time is between the 6th and 10th days. During this interval the wound comes together very much as in primary suture; it is unnecessary to trim the margins and undercutting is necessary only if there has been skin loss. Interrupted vertical mattress sutures of heavy silk are used, placed in such a fashion as to accurately approximate the skin margins and obliterate all dead space. Buried sutures should be avoided when possible. In a deep wound, rather than create dead space, it is better to leave a small defect and drain by a wick of gauze or small tube.

Most writers stress the point that there must be no tension. In fact, in secondary suture considerably more tension may be used than would be permissible in primary suture, because in the latter case the wound is entering a phase of reaction and with swelling the sutures will tighten, while in the former the wound is stabilized and not only will swelling not occur, but any existing œdema will disappear, so that the tendency will be for sutures to slacken. Particularly in wounds of the thigh where a considerable bulk of muscle bulges through the defect in the fascia there may be passive œdema which will not decrease until the muscle hernia is supported by closure of the skin. This factor explains why in some cases in which the degree of tension will not permit secondary suture in one stage, on returning to the wound a week later the suture may be completed without difficulty. Tension may be used up to, but not beyond, the point where blanching of the skin margins appears.

The purpose of the suture is to immobilize two tissue surfaces in apposition to each other so that they may heal. If any bulk of muscle is involved sutures alone cannot do this: the part must be supported by plaster.

Stress has been placed on closure by suture, because, as pointed out in a valuable paper by Clarkson,[3] this is superior to the use of grafts and it can usually be done, if not in one stage in two, even in gaping wounds which at first sight appear to show a considerable skin loss. The important point is to obtain skin coverage early by whatever method is necessary.

CHEMOTHERAPY

The fundamental thing to understand about both penicillin and the sulfonamide series of drugs is that they cannot perform miracles. Their bacteriostatic effect is supplementary to, but by no means a substitute for the natural tissue defences. These drugs cannot sterilize necrotic tissue, sequestra, contaminated foreign material nor undrained abscesses. The surgeon must create a situation in which the tissue defences have the best possible chance to operate and he may then call on the additional help of chemotherapy. Reliance on the effect of chemotherapy to the extent of limiting the scope of surgery is likely to result in disappointment, if not disaster.

In the early period of a wound's history, before and immediately after primary surgical treatment, the danger is from spreading infection and the place where the drug is required is in the tissues immediately surrounding the wound. The only way in which a controllable level of the drug can be established and maintained there is by general administration, which should commence as soon as possible after wounding and be maintained after operation.

After operation the plasma that flows into the wound will contain a concentration of drugs similar to that in the blood stream and by inhibiting the growth of any susceptible organisms remaining in the wound will be helping to prepare the way for successful secondary suture. It does not seem reasonable, as a prophylactic measure, to expect benefit from sprinkling sulfonamide powder on the surface of a deep wound which contains necrotic muscle and contaminated foreign material.

While working in a Canadian General Hospital in England in 1940-41 I compared the results in a series of wounds which received local sulfanilamide at primary wound treatment with those in a similar series which received no sulfanilamide locally or generally, and could see no difference. In 1943 in the Mediterranean theatre it was routine practice in the forward units to use local sulfanilamide after primary surgery. When seen at the base it was evident that in these cases the drug had no appreciable effect in preventing wound infection. The quality of the surgery was the controlling factor.

Although it is doubtful whether local chemotherapy has any place before or after primary wound treatment, the conditions at secondary suture are different. Infection, if present, is confined to the surface of the wound and is amenable to local treatment. The exudative phase is over so that the drug is not washed out of the wound by a flow of plasma, but is absorbed.

It is not easy to assess the relative merits of the various drugs which are available. Of the sulfonamides, sulfanilamide has been widely used in the army for administration by mouth and it appears to be as effective as any drug in the series and to result in fewer complications. Penicillin is effective against very nearly the same range of organisms as sulfanilamide but is more potent. Within the range of sensitive organisms its effect is absolute, which means that if the surgical procedure can create the necessary ideal conditions, and an effective level of the drug is maintained for a sufficient length of time, the organisms will certainly succumb. It has the advantage that it is non-toxic. The disadvantage is that it must be administered parenterally and as it is quickly eliminated, the dose must be frequently repeated. This presents difficulties on the line of evacuation, but it has been amply demonstrated that by careful organization these difficulties can be overcome. It has not as yet been demonstrated whether there is virtue in using both drugs rather than penicillin alone.

The present practice in the army is both reasonable and successful. All casualties are started on a course of sulfanilamide as soon as possible after wounding. The simpler the course, the more likely it is to be carried out, so dosage is 2.5 gm. twice a day. In addition all cases with severe muscle damage, or major compound fractures, or any other wound in which severe infection is likely, are given an initial dose of 90,000 units of penicillin intramuscularly. During evacuation to the forward surgical centre further doses of 50,000 units are given every 5 hours. At the time of primary operation the surgeon decides whether to continue with sulfanilamide and penicillin or the latter alone. If continued, it is given intramuscularly in doses of 15,000 units every 3 hours, or as a continuous intramuscular drip at the rate of 80,000 to 100,000 units per day. Treatment is usually continued for 3 to 5 days after operation. In wounds involving joints, the pleural space or the subarachnoid space, penicillin is administered locally by injection, either alone or in combination with general therapy.

In secondary suture various techniques may be employed for different types of wound and degrees of infection, ranging from a single application of calcium penicillin-sulfanilamide powder for a clean superficial wound, to general parenteral administration, with or without local application, for larger and more complex wounds such as compound fractures. The excellent results which can be obtained have been described by Brown[2] and Bentley.[1]

RESULTS

It is notoriously difficult to assess the value of any given method of wound treatment. A survey of a group of battle casualties treated in a Canadian General Hospital in the south of England in the 4-weeks period following the invasion of Normandy will, however, give an impression of results with the method of treatment outlined above. The casualties were moved across the channel in various sorts of craft and at the port were transferred to an ambulance train for the trip to the hospital. There was an average of 282 patients per train, and in the 4-weeks period 3,382 patients were

admitted. In the first two trains no patient had received more than first-aid treatment, including prophylactic chemotherapy, but in subsequent trains an increasing number of the more serious wounds had received primary surgical treatment in forward units, until finally all serious cases arrived treated. From the beginning, penetrating wounds of the abdomen and some of the larger chest wounds were picked out for treatment elsewhere, but wounds of the extremities of all degrees of severity were received. There was no death in this group of battle casualties.

In spite of the difficulties of collecting and evacuating casualties in the early days of such an operation the prophylactic administration of sulfanilamide, and of penicillin when indicated, had been well carried out. The "untreated group" had wounds from 2 to 6 days old so were an excellent test of the efficiency of the method. The striking feature was the degree of putrid infection which could exist locally without serious spreading infection. At operation a thin layer of black or greenish necrotic muscle would be excised to reveal pink bleeding muscle, showing only œdema. Mixed clostridia were cultured from virtually all these wounds, but in the whole series there was only one case of true severe clostridial myositis and 4 cases of clostridial cellulitis. The former case had a severe muscle wound of the thigh and had received prophylactic penicillin. Following radical muscle excision and further penicillin he recovered without amputation. The 4 cases of cellulitis all recovered rapidly with wide incision and penicillin. In the whole series only 6 major amputations were done, 4 for irreparable damage to an extremity, and 2 for gangrene due to vascular damage. In none was infection a determining factor.

The fact that such severe local sepsis could exist with a very low incidence of serious spreading infection seems to be convincing evidence that the prophylactic use of chemotherapy was a factor in confining the infection to the damaged tissue.

A measure of the success of primary wound treatment is the proportion of cases which at the end of 5 to 10 days are clinically clean and ready for suture. No accurate estimate of this could be made, as the less severe cases, if doing well, were evacuated on the 3rd or 4th day. The severe cases were retained and secondary suture done if it was possible. The transformation of the majority of these putrid wounds to clinically clean wounds which could be closed without hesitation was most impressive.

In the few cases which were not ready for suture there was always a technical error, failure to find a large foreign body, a piece of battle dress, or a deep extension of the track. Secondary wound toilet was done and suture deferred for a week.

Although they represent specialized groups of wounds which have not been discussed in detail in this paper, the results in penetrating wounds of joints and chest illustrate the ability to control infection conferred by a combination of surgery and chemotherapy. As all these cases were retained complete data is available.

There were 12 penetrating wounds of major joints: knee 9, elbow 2, ankle 1. Of these, 9 were associated with major bone injury. Only two had received any surgical treatment before admission, and only one had received penicillin, but all had received sulfanilamide by mouth. Treatment consisted of aspiration of the joint for culture, wound excision, closure of the synovial membrane leaving skin open, injection of 20,000 units of penicillin into the joint, application of a plaster with a window and further daily aspiration and injection of the joint. The number of doses was judged by the clinical course and the results of the culture. All cases associated with bone injury were given parenteral penicillin in addition.

There were only 4 sterile cultures. The positive cultures were *Staph. pyogenes* 2, clostridia 2, non-hæmolytic streptococcus 1, and the others were doubtful pathogens (diphtheroids, *Staph. saprophyticus*). In no case were more than 4 injections required and in all cases infection was abolished from the joint.

There were 36 penetrating wounds of chest, of which 23 had hæmothorax. These cases were treated by daily aspiration and injection of 20,000 to 30,000 units of penicillin. Empyema due to a clostridium, apparently *B. welchii*, developed in one case in which there was a large metallic foreign body in the pleural space. By repeated aspiration and penicillin instillation the infection could be controlled but not abolished, and the eventual empyema cavity was narrowed down to a small area easily cured by drainage.

DISCUSSION

In this paper primary wound treatment and secondary closure have been discussed together as two complementary parts of one planned course of treatment. This has been deliberate, because the conception that virtually all wounds should be closed at an early stage in their history is the most significant advance in surgery in this war. The chief contribution that penicillin has made has been not only to increase the proportion of simple soft tissue wounds which can be closed successfully, but also to render suture possible in a large group of deeper wounds and compound fractures in which closure would not be attempted without the added protection of the drug.

In order that closure may be accomplished in as many wounds as possible at the ideal time it is necessary that the whole management of casualties be directed toward this aim. After primary surgery in the forward unit the casualty is evacuated, so that before the end of week he has reached a hospital where not only may suture be done, but he can be retained for up to 14 days after suture. Along the line of evacuation the wound should not be examined unless a definite indication arises, so that in all cases in which primary surgery was adequate the first dressing may be done in the operating theatre and suture carried out at once.

Although there are wounds in which a special indication for early closure exists, as for example in nerve injuries, so that an elective suture may be done at the fifth or sixth week, in wounds involving tendons which will become fixed by granulation tissue if the wound is left open; and in compound fractures of superficial bones such as the tibia, in which bare bone at the bottom of a shallow wound must inevitably result in osteomyelitis if it is left exposed, the principle of early closure should be applied to all wounds from the most minor to the most major. When this principle is applied, not only is there a great saving in hospital days and saving in function of the wounded part, but there is also a great decrease in the general physical and mental deterioration of the individual which must be made good at a convalescent depot before he can again resume his rôle as a fighting man.

SUMMARY

1. The natural history of the pathological changes in contaminated war wounds is described and the manner in which it can be favourably affected by surgical treatment pointed out.

2. It is suggested that there is little virtue in the local use of chemotherapeutic agents either prophylactically or at the time of primary wound treatment, but that there is definite virtue in using general chemotherapy prophylactically and as an adjunct to adequate primary surgical treatment.

3. Some of the results of treatment in casualties from the Normandy campaign are described.

4. It is suggested that the development of the principle that all wounds can and should be closed early in their history is the most important advance in surgery in this war, and that it is in furthering this object that penicillin has made its greatest contribution to war surgery.

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RÉSUMÉ

Les plaies de guerre contaminées ont une pathologie identique: inflammation, gonflement, œdème, troubles circulatoires et pullulation des anaérobies. Lorsqu'il s'agit de traiter ces plaies, il faut débrider largement et suturer. La chémothérapie locale, prophylactique ou thérapeutique, a peu de valeur; la chémothérapie sera efficace si elle est donnée dans les veines, dans les muscles, sous la peau et même par la bouche. Les sulfamidés et la pénicilline sont actuellement les deux grands agents chémothérapiques. Les blessés de Normandie ont bien répondu à la thérapeutique décrite ici. Il faut encore se rappeler que les blessures bénéficient de l'occlusion précoce; Trueta l'a démontré bien avant la pénicilline. Le principe de la fermeture précoce vaut toutes les plaies, superficielles et profondes.

JEAN SAUCIER

There is not always a steadied and continued progress in health reform. Reforms in one field or another, like civilization, move forward by jerks. Often the jerk is caused by some calamity. Typhoid fever epidemics were responsible for the improvement of the water supply of many cities in years past. Floods are often followed by the construction of break-waters and works for river control. People learn by experience, by suffering. The university of hard knocks is one in which we are all classmates.—Ivan Schultz, *Canad. J. Pub. Health*, **36**: 47, 1945.

PENICILLIN CREAMS

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SEVERAL methods have been described for the topical application of penicillin, *e.g.*, solutions,[1, 2] penicillin-sulfanilamide powder,[2] penicillin ointment[1] or cream.[3, 4] In many instances a cream provides the most convenient method for the treatment of surface infections. Such a cream should possess a suitable consistency, be non-irritating and permit sterilization. It is most important, however, that the composition of the cream be such that the potency of the penicillin incorporated in it will be maintained for as long as possible at temperatures up to 37° C.

For several months we have been studying the stability of penicillin in a number of cream and ointment bases when stored at refrigerator, room and body temperatures. This investigation was undertaken despite the fact that fairly satisfactory stability results had been obtained with the cream described by Clark *et al.*,[3] because one of the principal ingredients, lanette wax, could not be obtained in any large quantity in Canada. As a substitute (see No. 2 below) a cream composed of materials which are inexpensive, readily available and in which penicillin is reasonably stable, was devised on suggestions made by Dr. C. C. Lucas, Banting and Best Department of Medical Research, University of Toronto. A fairly extensive clinical trial of this cream at Christie Street Hospital and elsewhere has given results which on the whole have been satisfactory. Other preparations were also studied and the findings are included in this paper.

I. COMPOSITION AND pH OF BASES INVESTIGATED

Preparation 1. (Clark *et al.*[3])

Lanette wax (Sx)	50.0 gm.
Castor oil	120.0 c.c.
Water	275.0 c.c.

pH of preparation 6.9

Preparation 2.

Stearic acid (granular)	20.0 gm.
Span 60 (Sorbitan monostearate)*	10.4 gm.
Span 80 (Sorbitan monooleate)*	2.0 gm.
Tween 20 (Polyoxyalkylene derivate of Sorbitan monolaurate)*	5.6 gm.
Water	138.0 c.c.

pH of preparation 6.5

Preparation 3.

Same formula as No. 2 with 20 c.c. of glycerin replacing an equal volume of water.

Preparation 4.

Eucerin L.M.†	30.0 gm.
Water	70.0 c.c.

pH of preparation 5.6

Preparation 5.

Eucerin	30.0 gm.
Water	65.0 c.c.
Phosphate buffer pH 7.2	5.0 c.c.

pH of preparation 6.5

Preparation 6.

Eucerin	70.0 gm.
Water	25.0 c.c.
Phosphate buffer pH 7.2	5.0 c.c.

pH of preparation 6.0

Preparation 7. (A sample of this preparation and the formula was supplied by Dr. Douglas Ackman. Montreal.)

Stearic acid	15.0 gm.
Lanoline	8.0 gm.
Mineral oil	25.0 gm.
Triethanolamine	2.0 gm.
Carbitol	5.0 gm.
Distilled water to	100.0 c.c.

pH of preparation 8.2

Preparation 8. (A sample of this cream was supplied by Flt.-Lt. Hudson, R.C.A.F., Christie Street Hospital.)

Sodium laurylsulphate	40.0 gm.
Cetyl alcohol	320.0 gm.
Glycerin	540.0 gm.
Lanoline	40.0 gm.
Water	2,200.0 c.c.

pH of preparation 6.0

Preparation 9. Surgical Lubricant (Parke, Davis & Co.; contains tragacanth, chondrus, glycerin, boric acid and aromatics.)

pH of preparation 5.0

It will be observed that Preparation No. 3 is the same as Preparation No. 2 with the addition of glycerin. The effect of this substance was tested because it was common to Preparations No. 8 and No. 9 in both of which penicillin was quickly destroyed at 37° C. Those numbered 4, 5 and 6 all contained eucerin L.M. but the ratio of eucerin to water was varied and the pH of the preparation adjusted with buffer to determine the influence of these factors on the stability of penicillin. Difficulty was encountered in determining the pH of preparations containing eucerin so that the figures given should only be considered an approximation.

* Aided by a grant from the National Research Council, Ottawa.

* Atlas Powder Co., Wilmington, U.S.A.
† Herts Pharmaceuticals Ltd., England.

II. STABILITY STUDIES

The procedure followed was to sterilize the base and then to make a bulk mix of an aqueous solution of sodium penicillin and the cream to give approximately 200 units per gram. The mixture was divided into three parts which were stored in screw-capped glass containers at refrigerator, room and incubator temperature. An assay was done soon after the penicillin was added to the cream and was repeated from time to time thereafter on the samples stored under different temperature conditions.

Assays to determine the total units of penicillin per gram of cream were performed by making appropriate dilutions of measured quantities in phosphate buffer (pH 7.0). The unitage was determine by the cylinder-agar plate method using 1 and 2 unit standard solutions for comparison. In some instances aqueous dilutions were not satisfactory and extraction into chloroform or other organic solvent was a necessary preliminary step. The procedure adopted for the assay of each preparation was such that the unitage determined just after it was prepared agreed closely with the theoretical value per gram.

The results of this study are given in Table I. For ease of interpretation the actual unitage found has been converted in the table into the percentage of penicillin remaining per gram of cream. It will be seen from this table that the penicillin in preparations Nos. 6, 7, 8 and 9 was very rapidly destroyed at 37° C. and also, but at a somewhat slower rate, at 24° C. and 8° C. No loss in potency is shown in the table for preparations 3 and 5 during the time they were under test at 8° C. Examination of the complete stability data regarding these preparations, particularly those at 37° C. indicates however that they are not appreciably more stable than other preparations of similar composition (Nos. 2 and 4) which were studied for a longer period of time. For these reasons we consider that none of the formulæ tested provides a base in which penicillin is sufficiently stable to warrant bulk manufacture of the preparation even with storage at refrigerator temperature. For hospital use, however, it is not necessary to have a cream in which penicil-

TABLE I.

RELATIVE STABILITY OF PENICILLIN IN VARIOUS OINTMENT BASES
(All creams were made up originally to contain 200 units per gram)

	Percentage of penicillin remaining per gram of cream									
Days after preparation	1	2	4	7	14	21	28	35	74	121
Cream No. and Type				*Stored at 8° C.*						
1. Lanette wax	100	100	100	95	95	70	60			
2. Spans and tween	100	100	100	95	90	90	85	80	70	40
3. Spans, tween and glycerin	100	100	100	100	100	100	100	100		
4. Eucerin 30%—pH 5.6	100	100	100	95	90	85	80	75	60	
5. Eucerin 30%—pH 6.5	100	100	100	100	100	100				
6. Eucerin 70%—pH 6.0	..	..	..	..	60	45	35	26		
7. Triethanolamine	60	50	20	10	2					
8. Cetyl alcohol	100	70	65	35	25	10	2			
9. Surgical lubricant	70	60								
				Stored at 24° C.						
1. Lanette wax	100	95	80	70	65	35	25			
2. Spans and tween	100	95	85	70	50	30	25	25	20	5
3. Spans, tween and glycerin	100	95	80	70	50	30	20	10		
4. Eucerin 30%—pH 5.6	100	100	100	60	50	40	35	20	0	
5. Eucerin 30%—pH 6.5	100	100	100	100						
6. Eucerin 70%—pH 6.0	100	100	70	60	35	15	10	4		
7. Triethanolamine	45	25	5	2						
8. Cetyl alcohol	40	25	5							
9. Surgical lubricant	40	30								
				Stored at 37° C.						
1. Lanette wax	80	70	55	25	15	5				
2. Spans and tween	80	65	35	15	5					
3. Spans, tween and glycerin	80	45	35	5						
4. Eucerin 30%—pH 5.6	90	80	50	10	2					
5. Eucerin 30%—pH 6.5	90	85	55	20						
6. Eucerin 70%—pH 6.0	45	30	20	2						
7. Triethanolamine	25	20	5	1						
8. Cetyl alcohol	2	0								
9. Surgical lubricant	8	2								

lin is stable for a long time. As can be seen in the table the potency of penicillin was maintained quite well for two to three weeks in the first five preparations when stored at refrigerator temperature. Consequently it would be quite satisfactory to prepare such penicillin creams in sufficient quantity for two weeks' use.

That the concentration of penicillin initially present in a cream affects the stability was demonstrated by the following experiment. A batch of cream No. 2 was prepared and divided into five portions, and to these sodium penicillin was added to give 100, 250, 500, 750 and 1,000 units per gram respectively. The samples were left at room temperature and were assayed on the tenth and twentieth days. The results are shown in Table II from which it will be seen that as the concentration of penicillin per gram of cream is decreased the stability also decreases.

TABLE II.
STABILITY OF PENICILLIN IN RELATION TO UNITAGE PER GRAM OF CREAM
(Stored at 24° C.)

Original unitage per gram	100	250	500	750	1,000
Percentage penicillin after:					
10 days	30	45	55	65	70
20 days	20	30	40	50	60

III. STUDIES WITH PREPARATION NO. 2

(*a*) *Method of preparation.*—Weigh out the stearic acid, Span 60, Span 80 and Tween 20. Add to the distilled water. Autoclave with 17 lb. steam pressure for 20 to 30 minutes. When nearly cool stir thoroughly to obtain a smooth cream.

The autoclaving serves the dual purpose of melting the ingredients and sterilizing the mixture. Since the Span 80 and Tween 20 are oily in nature it might be questioned whether steam sterilization would be effective but experiments in which dried spores of *B. subtilis* were added to these compounds prior to autoclaving demonstrated that the test micro-organism was killed.

The cream base thus prepared is acid (pH 4.5) and it is advisable, before adding penicillin solution, to bring the pH within a range at which penicillin is more stable. This is accomplished by the addition of 10 c.c. each of sterile 5% solutions of anhydrous Na_2HPO_4 and KH_2PO_4. Four c.c. of a solution of sodium penicillin (10,000 units per c.c.) is then mixed thoroughly into the cream with aseptic precautions. The amounts given in the formula above make 200 grams of cream and the unitage of penicillin is 200 units per gram.

The penicillin cream is stored at refrigerator temperature.

(*b*) *Method of application.*—In the routine clinical use of penicillin cream care must be taken to keep it sterile since contaminants, especially moulds, conceivably grow and destroy the penicillin. In the treatment of infected lesions, the sterility of the cream in the bulk container is most conveniently maintained by transferring with a sterile tongue depressor the amount required for treatment to a sterile piece of gauze or other material. The cream may then be applied directly on to the affected area using the same tongue depressor.

(*c*) *Absorption of penicillin from cream.*—During the use of this cream in the treatment of infected burns a study was undertaken to determine how long penicillin could be detected in the cream applied to the burned area. For this purpose measured amounts were spread on two-inch square gauze dressings and applied to the burned area. Cultures from the site selected had grown *Staph. aureus* and *Strep. hæmolyticus.* As controls similar dressings were applied to the patient's normal skin. At various intervals one of the experimental dressings was removed, soaked and extracted in phosphate buffer and assays done for penicillin. The total units of penicillin obtained from the dressings in one case are shown below.

		Units
Dressing before application to burn		900
After application for:	6 hours	135
	24 hours	60
	30 hours	45
	48 hours	8
Control applied to normal skin for:	24 hours	200
	48 hours	100

These results indicate that dressings of penicillin cream should be changed at least every 48 hours. It is very likely that a daily change of dressing would be found necessary in those cases in which the bacterial flora of the lesion under treatment contained Gram-negative bacilli, as some of these bacteria are known to destroy penicillin. The low unitage of penicillin found in the dressings applied to the normal skin is rather surprising. It is impossible to estimate how much of the loss was

due to destruction of penicillin and how much to diffusion into sebaceous and sudoriferous secretions.

(*d*) *Clinical use.*—This cream has been used in the treatment of surface lesions from which penicillin-sensitive micro-organisms were grown. The conditions treated included infected burns, varicose ulcers, impetigo and sycosis barbæ and the clinical results have been similar to those reported by Wrong.[4] It has also been used in treatment of maxillary sinusitis by injecting a small amount by means of an antrum cannula and syringe into the affected sinus every two to three days. Before each injection the cream remaining in the sinus should be washed out with saline. Since we do not know how long the inert ingredients of the cream persist in a closed cavity, we do not advise its use in any locality which cannot be irrigated readily.

In a few cases a macular eruption has occurred at the site of application of the penicillin cream. This eruption subsided when treatment was discontinued. In one patient the subsequent application of compresses of aqueous penicillin did not occasion a recurrence of the dermatitis. This patient was apparently sensitive to some ingredient of the cream base. In other cases it was not clearly demonstrated whether the eruption was due to sensitization to penicillin or to the cream base itself. However, the possible occurrence of dermatitis at the site of application should be borne in mind particularly in patients who receive treatment for more than 10 days.

DISCUSSION

The data presented above show that bulk manufacture of penicillin creams should not be undertaken unless a cream base is found in which the potency of penicillin is maintained much better than in even the best of those that we have studied. Some of the preparations were not at all satisfactory as bases for penicillin creams.

Certain facts should be borne in mind regarding the dispensing of penicillin creams for use in hospitals or in the home. Stability depends not only on the temperature of storage but on sterility. An unsterilized cream base which by itself will not support mould growth may do so when penicillin is incorporated in it. We have observed this on several occasions. Mould growth occurs most frequently in preparations made with penicillin of low unitage per mgm. indicating that it is the impurities which provide the nutrient rather than penicillin. We consider it advisable always to sterilize the cream base prior to the incorporation of sterile penicillin solution. This may prove to be an unnecessary precaution when relatively pure penicillin is used. The stability of penicillin in preparations Nos. 1 to 5 is such that provided the penicillin cream was stored at refrigerator temperature it would be satisfactory for hospitals or druggists to prepare at one time a mix of the quantity estimated for two weeks' requirement. However, the amount of cream dispensed from the bulk container to each patient should not exceed that necessary for one week of treatment since the stability of penicillin cream is much lower at the temperatures to which it would probably be subjected during home use.

The effect of increasing the amount of eucerin in the cream base may be seen by comparing the data for preparations 4 and 6 in Table I. The stability of penicillin in cream containing 70% eucerin was found to be less than in the one with 30% in spite of adjustment of pH to a point which other studies with aqueous solutions had indicated would be more favourable. It, therefore, seems obvious that if a eucerin base cream is used the percentage of this substance incorporated should not be excessive. The results of storage at 37° C. do not indicate any markedly beneficial effect through the minor adjustments of pH which were made.

Preparation No. 2 has been studied fairly extensively both in respect to stability and clinical usefulness. It seems to be quite acceptable clinically as a cream base and has the further advantage of being easily compounded from readily available materials.

SUMMARY

Data are presented on the stability of penicillin in various cream and ointment bases stored at refrigerator, room and body temperatures. In some of the preparations penicillin was relatively stable while in others it was destroyed rapidly.

None of the cream bases investigated maintained the potency of the penicillin incorporated in them for a length of time sufficient to warrant bulk manufacture.

The formulæ of several cream bases are given. Details are described of the method of

preparation of one which has proved satisfactory on clinical trial.

The authors would like to express their appreciation of the valuable technical assistance rendered by Miss Joan Hennessy.

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OBSERVATIONS ON SALICYLATE THERAPY IN RHEUMATIC FEVER

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R.C.N.

SALICYLATES have been used therapeutically in rheumatic fever since 1874[3] and beneficial effects have been recognized by most observers.[5] Their antipyretic action and ability to alleviate the joint symptoms are generally accepted. Whether they alter the prognosis, as far as the heart is concerned, has been a disputed point for many years. It has not been discussed much in the last decade because both clinical experience and earlier investigation indicated little beneficial effect by salicylates on the heart valves or muscles.

Because these studies appeared inadequate, Coburn[2] has re-opened the question with suggestive evidence that both prophylactically and therapeutically salicylates have a protective effect on the heart in acute rheumatic fever. Furthermore, he has been instrumental in developing a method of readily estimating the quantity of salicylate in the blood stream. In this way, he has been able to relate the clinical effects with varying blood levels of the drug and produce more definite evidence that very large doses are sometimes needed to control the joint symptoms.

Hanzlik[5] has reviewed the outstanding contributions to this subject in the literature up to 1926. These, with a rare dissenting voice point to the conclusion that salicylates are of genuine value for symptomatic relief. The evidence is less definite in regard to the effect upon the heart. Here the investigation has usually not been adequately controlled.

In 1914 Miller[3] quotes a statistical review by Pribram of many studies and concluded that cardiac complications were not reduced by salicylates. Swift[4] in 1925 infers a somewhat favourable effect of this drug on the heart and explains it by a reduction in fever and heart rate which diminishes the amount of work done by both muscle and valves.

Coburn[1] in 1942, presented a prophylactic study in 186 rheumatic subjects who were found to have a streptococcal pharyngitis. Part of this group was given salicylates for one month following the respiratory infection, and only one of their number developed a rheumatic recurrence. Among those in the untreated control group 41% developed rheumatic recurrence.

In a study reported in December, 1943, Coburn[2] records his use of salicylates therapeutically in a group of 101 rheumatic patients: 63 had received only small doses of sodium salicylate and 21 of these were reported to have developed physical signs of heart disease. Compared to this group are 38 individuals who received large doses of the same drug daily (10 gm.). None showed evidence of valvular disease of the heart. These studies were controlled by the estimation of the plasma salicylate level in the blood. He concluded that a plasma salicylate level of 35.0 mgm. % may be required to suppress the rheumatic reaction and that plasma levels below 20 mgm. % may be sufficient only to relieve symptoms while masking a progressive inflammatory process.

PRESENT STUDY

During the winter, spring and early summer of 1944, an epidemic of streptococcal infection was prevalent at H.M.C.S. *Cornwallis*. In the wake of this epidemic cases of rheumatic fever appeared in goodly numbers. Between February and the end of July, 121 cases were admitted to the hospital with definite rheumatic fever: 18 of these had interfering factors that made it necessary to drop them from a study of the effect of salicylate. The most common interfering factor was the occurrence of an upper respiratory infection such as a sore throat, otitis media, sinus infection, etc., appearing half way through the illness and prolonging the elevated sedimentation rate. Others of these patients received irregular or inadequate doses of salicylates, and therefore had to be eliminated. A few

showed signs of intolerance to the drug. On reviewing the findings in these 18 cases, it was found afterwards that they would not alter the series except for those with intercurrent infections who had prolonged elevation of the sedimentation rate. The incidence of heart disease was not affected.

A summary of the 103 cases in the series is shown in Table I.

TABLE I.

1. Average age ..... 20½ years
2. Previous history of rheumatic fever in 26 cases. 5 other cases had rheumatic heart disease on admission, with no previous history of rheumatic fever. Therefore, the total number with pre-existing rheumatic infection is 31 out of 103 = 30%.
   (This was checked by a letter to the parents in over 100 cases.)
3. Family history of rheumatic fever, or rheumatic heart disease 12%
4. In the whole group 46% had tonsils in.
   54% had tonsils out.
   Out of 25 with heart disease:
   8 had tonsils in.
   17 had tonsils out.
5. *Precipitating Event:*
   Sore throat 47%
   Scarlet fever 36%
   Colds 12%
   Otitis media 1%
   Sinus infection 1%
   No known cause 3%
   Average interval after precipitating event until onset of rheumatic symptoms = 1.7 weeks.
6. *Electrocardiogram:*
   21% had a P.R. interval of over 0.20 secs.
7. *Heart Disease:*
   25% had heart disease
   1 % on admission
   8% acquired in hospital.
8. *Time Seen:*
   Average time each case in the group followed 5½ months. Range 2 months to 10 months. Average time of case in hospital 3 months.

It will be noted that the general characteristics are similar in most respects to previously recorded studies in the services. The incidence of heart disease is lower than usually reported in the services where various studies based on heart murmurs have recorded figures from 17 to 90%.[2, 7, 8, 9] These have not clearly differentiated between heart disease found on admission and that acquired in hospital.

DIAGNOSIS

The diagnosis of rheumatic fever sometimes presents difficulties and for this reason only those patients who showed the typical characteristics of the disease were included. Almost without exception this meant the development of a multiple arthritis, involving two joints at least, migratory in character and associated with fever at the onset. Many had swelling of the joints but this was not considered essential for diagnosis. All cases had a well elevated sedimentation rate on admission. Those that had no elevation or only a slight one, were excluded. It will be noted that an unusually high percentage (97%) had a history of an upper respiratory infection in the month preceding.

Our second diagnostic problem was that of determining the presence or absence of heart disease. In rheumatic fever, one frequently hears mild indefinite murmurs in or around the mitral area that are transient and difficult to assess. In many cases they are associated with changes in heart rate, rate of blood flow, alterations in heart muscle from prolonged stay in bed, very questionable heart disease, etc. For this reason, only those that had definite evidence of heart disease at the time of their discharge from hospital were included. This also eliminated those that had lengthening of the conduction time as their only cardiac defect. Heart disease was considered present if (1) a distinct systolic murmur could be heard at the apex and was transmitted to the axilla, or (2) an aortic diastolic murmur existed, or (3) a pericardial friction rub was heard, or (4) a mitral diastolic murmur. Enlargement of the heart was of no help, because when this occurred the other signs were more than adequate for diagnosis. A friction rub was heard in only one case. In this study the authors saw all the cases and made frequent observations on them. The interpretation of murmurs was then consistent throughout. The cases were followed on an average of 5½ months—some up to 11 months. None developed heart disease after discharge from hospital as long as they were seen.

SALICYLATES

Of the 103 cases in the salicylate study, 70 were treated with a daily dose of 10 to 13.3 gm. (150 to 200 grains) of sodium salicylate or acetyl salicylic acid. (These drugs were found to produce similar blood levels). The drug was started on admission to hospital and was given in 5 doses daily beginning at 7 a.m., and completed at 10 p.m. Each dose was accompanied by an equal quantity of sodium bicarbonate. The control group of 33 cases were given 0 to 2 gm. (0 to 30 gr.) salicylates daily. The salicylates were usually kept up for 2 to 4 weeks after the sedimentation rate was normal. Sedimentation rates were done weekly on all cases, the

Westergren method being used. A sedimentation rate was considered normal when the reading was 10 mm. or less in one hour. Since a rare case did not fall below 10 mm. the sedimentation rate was then taken as normal if 2 successive readings were less than 15 mm. in 1 hour. One gm. of sulfadiazine was given to each patient as soon as the sedimentation rate came to normal. This was kept up as long as the man continued at the base.

Plasma salicylate levels were done on a limited group only since the details of the method were not available at the beginning of the study. Blood levels were obtained on these cases on several occasions in each patient. The blood was drawn at 7 a.m., before the patient had his breakfast and before his first dose of salicylate was given for that day. Since the last previous dose had been given at 10 p.m., the night before, this represents the lowest level in 24 hours. The results shown below are based on an average of at least 3 readings in nearly every instance. There was some variation from day to day but as a rule it was not marked.

RESULTS

1. *The effect on the sedimentation rate.*—(*a*) Seventy cases on high doses of salicylates (10 to 13.3 gm.) sedimentation rate returned to normal in an average of 4.0 weeks. Range, 1½ to 12 weeks. (*b*) Thirty-three cases on low doses of salicylates (0 to 2 gm.) sedimentation rate returned to normal in an average of 4.5 weeks. Range, 2 to 12 weeks.

The control group took one-half week longer to return to normal than the treated group.

It might be pointed out that in more than half the cases the patients were already in the hospital for an upper respiratory infection or scarlet fever at the time the rheumatic symptoms appeared, so that treatment could be begun early. In the remainder, hospitalization took place with few exceptions on the first and second day of acute rheumatic signs.

There was no significant difference in time of elevated sedimentation rate between those on 10 gm. of salicylate daily, and those on 13.3 gm.

2. *The effect on the heart.*—When a patient is admitted to hospital with an aortic diastolic or mitral systolic murmur already present, it is often impossible to say how long these murmurs have been there. As a rule, it indicates the murmur preceded the present attack of rheumatic fever, and therefore was due to a previous attack. Furthermore, is is very difficult to tell whether the present attack has produced additional heart damage or not. For this reason, in evaluating the effect of salicylate on the heart it was considered wise to study primarily the patients who had normal hearts on admission to hospital. Of the 103 cases, 86 had normal hearts on admission. The incidence of heart disease is shown in this group as follows: Low salicylate group (0 to 2 gm.), 29 cases, 3 developed heart disease, 10.3%. High salicylate group (10 to 13.3 gm.), 57 cases, 5 developed heart disease, 8.8%.

Three of the 5 cases who developed heart disease in the "high" group had blood levels done and were found to be 30, 30 and 31 mgm. % respectively in each case, indicating a good concentration in the blood. In the other two cases, blood levels were not obtained.

Amongst those that had heart disease on admission to hospital there were 5 obviously made worse by their rheumatic infection. If these are divided into their respective salicylate groups and added to the cases of newly developed heart disease mentioned above, the incidence in both groups is again similar. Of the low salicylate group 12.1% either developed new heart disease or pre-existing heart disease was made worse. The figure for the high salicylate group was 10.3%.

Plasma salicylate blood levels.—Blood levels were obtained on 26 cases and the findings may be summarized as follows: 19 instances on 13.3 gm. sodium salicylate daily; average blood level, 31 mgm. %; range, 24 to 39 mgm. %; 12 instances on 10 gm. sodium salicylates; average blood level, 27 mgm. %; range, 19 to 37 mgm. %.

It will be seen that the concentration in the blood while at a fairly good level was not as high as is recommended by Coburn. (He recommends 35 mgm. % as the optimum). However, our level during the most of the 24 hours was probably close to that figure since our plasma salicylate estimations were done on blood in the morning 9 hours after the last preceding dose.

We found the concentration obtained in our study sufficient to suppress all joint symptoms within 1 to 2 days of starting the drug. That is by the time the drug had mounted in the blood stream to a steady level the symptoms

had cleared. There was one patient who developed a recurrence of his rheumatic infection with chorea and carditis while on quite adequate doses of salicylate. The blood level averaged over 30 mgm. %.

In the control group most joint symptoms subsided within the first three or four days, but several patients had severe joint pains and swelling for four or five days. One man in particular was extremely uncomfortable and had to be fed. He had a relatively mild bout of rheumatic arthritis followed in 2 weeks by a severe attack. In the second one the arthritis continued to wander from joint to joint for nearly ten days before finally subsiding. This instance alone is strong evidence in favour of giving salicylates in adequate doses to relieve the symptoms.

Salicylate tolerance.—The most common toxic symptoms encountered were epigastric distress, nausea and vomiting, tinnitus and deafness. These occurred overwhelmingly in the first few days after the start of salicylate administration. After this interval was passed the patient usually tolerated the drug fairly well. One-half had nausea early on while later this dropped to less than 10%. One-quarter had vomiting in the early stages but in a few days this was eliminated in every case. Tinnitus was a common finding, initially nearly half the patients complained of this symptom, but again it also dropped to a few instances. Deafness followed a similar incidence to vomiting, approximately one-quarter in the early stages, and an insignificant proportion later.

If satisfactory treatment is to be carried out it becomes imperative to instruct the patient in the details and encourage them through the first few days. Some epigastric distress may persist in a number, however, as long as the salicylates are continued. In these cases putting the patient on a bland diet with plenty of milk and fluids usually tides them over and permits adequate toleration of the therapy.

The more severe reactions are being reported elsewhere by Sable.[11] These have occurred in 6 cases in the R.C.N. in the past year, 3 from the present study. They have been characterized by hypernœa chiefly but one patient had an acute acne-like lesions on the skin and another went into a semi-comatose condition. All of these signs and symptoms subsided quickly when the drug was stopped, and in several instances it was found salicylates could be started safely again in adequate doses. We had no significant evidence of renal damage from the drug.

COMMENT

The authors have always used salicylates in rheumatic fever and have considered the question of a protective effect on the heart at intervals for the past ten years. Both have used moderately high doses in children averaging more than a grain per pound of body weight. On this dosage we have seen the usual incidence of heart disease develop and have not seen any notable effects on the hearts of those who already have active carditis.

One of us (J.D.K.) has had experience in English hospitals where unusually high doses of salicylates are commonly given. Three years were spent in association with Professor Wilkinson at the Children's Hospital in Birmingham. He rarely gives less than 10 gm. of sodium salicylate daily to children, and most of his cases of rheumatic fever are on 12 to 16 gm. daily. They received equal or double the quantity of sodium bicarbonate. A child of 9 or 10 who is severely ill with the disease may receive as much as 16 gm. in 24 hours. It is very rare to find a severe toxic reaction among these cases, although the vast majority had deafness or some tinnitus. In fact, Professor Wilkinson's test for adequacy of dose was to speak to the child from the foot of the bed and if the child couldn't hear him he knew he was getting enough. In other parts of the same hospital considerably smaller doses were used, giving one an opportunity to compare results.

There did not seem to be any obvious difference in the incidence of heart disease when the high doses were compared with moderate ones. It did appear, however, to suppress the activity of the patients and they lay more quietly in bed. A notable feature was the temperature chart. Within a day or two of admission the temperature was nearly always normal and remained so unless some intermittent infection or complication arose. When the children had their tonsils removed, which was usually done before their sedimentation rate had returned to normal, it was frequently impossible to tell from the temperature chart when the operation took place since there was so little disturbance to temperature and pulse. This temperature effect proved of value in determining whether or not

a bacterial endocarditis was superimposed. If the latter was present the salicylates did not control the temperature. It was difficult to judge the effect of the treatment on the severity of the heart lesions. One had the impression that these patients did a little bit better than those on other wards. However, several children died on quite adequate doses of salicylates. Heart disease was as prevalent as in other children's hospitals.

In the present study it would appear that the administration of 10 to 13.3 gm. of sodium salicylate daily has little if any effect on the rate of return to normal of the sedimentation rate. The numbers in the series are not sufficiently great to permit any definite conclusions in regard to protection of the heart by salicylates. All that can be said is that the drug did not appear to have any such effect from this limited study. At times it was noted that these large doses of salicylates were associated with an increased force and intensity of heart beat. It is possible that the cases that respond in this fashion may sometimes have harm done to the mitral valve from the added force of impact in the same way that too early exercise may damage the valve. It is worth noting that the incidence of new heart disease was only 10% of those that had normal hearts on admission. From this it is apparent that a study of several hundred rheumatic cases is necessary before an adequate number of controls and treated cases are obtained to decide this point.

From the literature[10] and personal observations the use of sodium bicarbonate with salicylate appreciably lowers the blood level of the latter. We have found since that 5 to 10 gm. of salicylate without soda bicarbonate produced the same or higher blood levels than 10 to 13.3 gm. of salicylates with an equal quantity of soda bicarbonate. Apparently the main reason for the use of this alkali with the salicylates is to prevent gastric irritation, although occasionally the carbon dioxide combining power is diminished if bicarbonate is not used. We have found that 5 to 10 gm. of sodium salicylate daily without bicarbonate is often well tolerated, particularly if given after meals or with a little milk. Frequently, however, the patient is more comfortable if given 3 to 4 gm. of the alkali daily.

Toxic effects sufficient to warrant discontinuing the drug are rare. Deafness and tinnitus are unpleasant but not sufficient cause for stopping the treatment. Marked hyperpnœa, coma, marked excitement and restlessness, kidney involvement are more definite indications for cessation of treatment.

In the 121 cases in the present series only 3 had symptoms of sufficient note to warrant stopping the salicylates. On one of these it was re-started successfully in 5 days. In one other the patient had been on 10 gm. of salicylate for nearly 8 weeks and the sedimentation rate had returned to normal.

We rarely found the administrations of salicylates the key in making a diagnosis of rheumatic fever. Occasionally it is somewhat helpful in differentiating between this condition and the rheumatoid type of arthritis.

Coburn[2] has recently demonstrated an inhibiting effect by salicylates on the antigen-antibody reaction in infection and suggests this may be the reason for its successful action in rheumatic fever. Whatever the explanation, there is no doubt that it very rapidly controls the arthritis and makes the patient much more comfortable. It reduces the temperature usually to normal and tends to keep it there unless complications arise. It thereby reduces the heart rate and one commonly sees a bradycardia in acute rheumatic fever where plenty of signs of active infection still persist.

The question of the use and dose of salicylates in rheumatic fever will need considerably more investigation to elucidate the problem satisfactorily. It is hoped that the large numbers of cases occurring in all branches of the service will be studied thoroughly to give us the complete answer to this question.

SUMMARY

1. The oral administration of 13.3 gm. (200 grains) of sodium salicylate with an equal quantity of sodium bicarbonate produces an average blood level of 31 mgm. %. Ten gm. (150 grains) of sodium salicylate with sodium bicarbonate produces a blood level averaging 27 mgm. %.

2. Such levels are sufficient to control joint symptoms, keep the temperature down and reduce the pulse rate.

3. The sedimentation rate returned to normal in an average of 4 weeks in the group on 10 to 13.3 gm. of salicylate and 4½ weeks in the group on 0 to 1.7 gm.

4. The incidence of heart disease was approximately the same in the high salicylate group as

in the low salicylate group. The numbers were not adequate to draw unequivocal conclusions.

5. Ten per cent of the rheumatic patients that entered the hospital with normal hearts developed rheumatic heart disease that could be recognized at the time of discharge.

6. Nausea, vomiting and tinnitus are much more common early in the administration of salicylates than after the patient has been receiving the drug for several days. These symptoms are not usually sufficient cause for stopping treatment. There was no evidence of kidney damage in this series. Three cases had toxic reactions characterized by hyperpnœa. One of these might be labelled severe.

The authors wish to express their appreciation of the help of Lieut. Alan Gornell, R.C.N.V.R. (SB) who gave invaluable aid in the biochemical field. Thanks is also due to Technician Sister Grace Thompson, R.C.N. (T) for her technical assistance.

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RÉSUMÉ

Administré par la bouche à raison de 13.3 gm. par jour, avec une quantité égale de bicarbonate de soude, le salicylate de soude se dose dans le sang à un taux de 31 mgm. %. Dix grammes de salicylate de soude, avec autant de bicarbonate donneront un taux sanguib de 27 mgm. %. Cette concentration suffit pour combattre efficacement les arthropathies et l'hyperthermie, et pour diminuer la fréquence du pouls. Le taux de sédimentation est peu influencé par la quantité de salicylate. Les complications cardiaques ne paraissent pas non plus diminuer avec les grosses doses de salicylates. 10% des malades observés et admis avec des cœurs normaux présentèrent en cours de séjour des cardiopathies qui furent notées et consignées à leur dossier. Les signes d'intolérance s'observent surtout au début; ils sont habituellement assez bénins pour permettre la continuation du traitement, à moins qu'il ne s'agisse de réactions toxiques accompagnées de polypnée.

JEAN SAUCIER

In order to get at the root of tuberculosis it is necessary to understand where its springs arise. From some crater in the depths of society among the most wretched poverty and misery, unemployment and imbecility, the fountain of tuberculosis infection is thrown up through the community and seizes upon all who are susceptible. Until these social evils can be got under control we shall never be quite free of tuberculosis. Until then we shall not deserve to be, and until then perhaps we shall be unable to do without it.—H. C. Olsen, *The Veterinary Bulletin*, **51**: 3, 1945.

THE PREVENTION OF ACUTE RHEUMATIC FEVER*

By C. W. Fullerton, M.D.

Montreal

IN the City of New York in the year 1938, there were 1,105 reported deaths from rheumatic fever and rheumatic heart disease, whereas from 6 other common childhood diseases, namely whooping-cough, diphtheria, measles, scarlet fever, cerebro-spinal fever and infantile paralysis, there were only 247 deaths reported. In other words there were five times as many deaths from this one disease as from a combination of these 6 other common childhood diseases.[1]

These figures are given to stress the necessity of some measure to prevent the recurrent attacks of this damaging disease. Until a few years ago we had no understanding of the mechanism involved in the production of rheumatic attack and all measures used to cope with the disease were at their best of a very hit or miss variety and all were equally futile.

In 1931 however, Coburn pointed out that all attacks of rheumatic fever were preceded by a streptococcic infection of the nose or throat and he later evolved the theory, with considerable clinical and laboratory proof, that the various manifestations of the rheumatic attack are the result of the response of sensitized tissue to an antigen antibody reaction as shown in Fig. 1.[2, 3]

Once this explanation of the disease was established a very obvious method of prophylaxis presented itself; if one could stop streptococcal infections then rheumatic fever should not occur. Coburn himself was the first to attempt this form of therapy, when in 1931 he took 10 rheumatic children to Puerto Rico, where he knew rheumatic fever never occurred, for a period of 6 months, and observed that during this period all the children became free of the disease. All streptococci disappeared from their nose and throat cultures. However, on returning to New York they soon developed streptococcic infections and these in turn were followed by rheumatic infections. It is interesting that in Puerto Rico he could not isolate any hæmolytic streptococci from the throat cultures of some 1,200 natives[2].

* Read before the Annual Meeting of the Quebec Division of the Canadian Medical Association, Montreal, January 27, 1945.

This method of preventing rheumatic fever however is not practical, though it is of interest that in the U.S. Army Air Force they have been sending all their cases of rheumatic fever, contracted in their northern camps, to camps in the southern states where the hæmolytic streptococcus does not thrive. They have been keeping their patients in the southern climate for a period of 6 months as a prophylaxis against an immediate recurrence.[4]

With the advent of the sulfonamides a practical method for the prevention of hæmolytic streptococcic infections presented itself and since 1936 numerous civilian investigators have administered daily doses of sulfanilamide and latterly sulfadiazine, to patients having had rheumatic fever. All these cases have recently been collected and analyzed and it has been found that in this 8-year period 815 rheumatic patients have been given this therapy, and in this group only 8, or less than 1% have developed rheumatic fever, while the incidence among control groups ranged from 10 to 35%.[5]

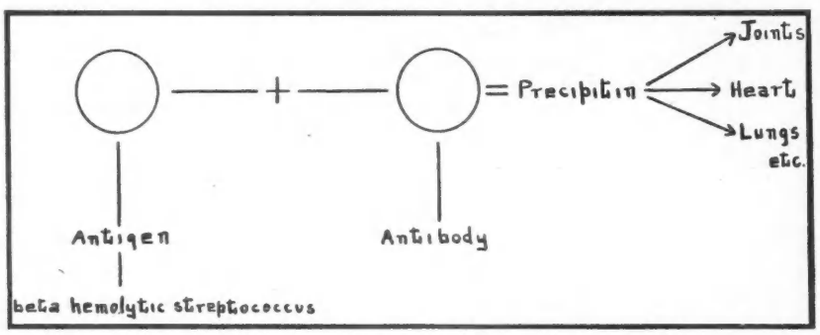

Fig. 1

In spite of these reports this method of treatment has not been generally used, as apparently the fear of toxic reactions from the continuous use of these drugs has outweighed the possible benefits in the minds of most physicians.

In the past few months however, the value of this prophylactic measure has received tremendous impetus by its adoption and wholesale use in the U.S. Navy where, in the winter of 1943, severe epidemics of hæmolytic streptococcic infections occurred. The time loss resulting from these infections at one naval station alone was some 550,000 man days which, from an economic standpoint, cost the United States Government $15,000,000.

In the latter part of the winter of 1943 it was decided to institute a widespread experiment in an attempt to cut this huge loss. Consequently 250,000 men were placed on daily doses of 0.5 gram of sulfadiazine twice daily, while another quarter of a million men were used as controls. During this period hospitalization for severe respiratory diseases was reduced 80 to 90%, streptococcic infections were reduced 85% and the incidence of acute rheumatic fever dropped so that for every 14 cases in the control group there was only one case in the treated group.

It is interesting too, that the incidence of scarlet fever dropped to zero, as did that of meningococcus meningitis while the incidence of pneumonia dropped 50%.

By February, 1944, in the uncontrolled group the incidence of respiratory infections had increased to such an extent that in some cases 10% of the available man power was lost. Therefore all naval stations were placed on the prophylactic therapy with similar rapid satisfactory reduction in the incidence of streptococcic infection and subsequent rheumatic fever; the cases of this latter disease dropped from 87 per 1,000 in the first week to 6 per 1,000 after 4 weeks of therapy.

In all cases receiving diazine therapy there was only one death and this one was proved to have a leukæmia. Mild skin reactions occurred in about 0.5% of cases whereas severe reactions such as granulocytopenia and exfoliative dermatitis occurred in about 1 case in 10,000.[6]

It would appear from this colossal experiment that this is the method of choice as far as the prophylaxis of acute rheumatic fever is concerned and the question now arises for what period of time and what dosage should be administered. It would seem that the dosage of 0.5 gram (7½ gr.) b.i.d. is adequate and from the prevalence of streptococcic infection in our northern climate, I feel that continuous sulfadiazine therapy should be instituted for a period of at least 3 years after an attack of acute rheumatic fever, as it has been shown that the danger of recurrence is 38.7% during the first year following an attack, 11.2% after a year's freedom from the disease and 6.6% after 2 years freedom.[7]

Caroline Thomas, of Baltimore, has given this therapy to some children for as long as 7 years

and she feels that when the disease occurs in young children they should receive this prophylactic treatment for at least 5 years.[5]

If agranulocytosis or exfoliative dermatitis is going to occur it happens between the 2nd and 4th weeks and up till 6 weeks frequent blood counts should be done and the patient should report immediately if any skin eruption or sore throat occur.

There are several other prophylactic measures that I would like to mention, briefly, and the first of these is that of diet, as it is has been shown that the diet of the average child with acute rheumatic fever is a deficient one and this deficiency is a multiple one of protein, calcium, vitamin A and riboflavin. These substances are all found in dairy products and it has been found possible to prevent the expected recurrent attack of rheumatic fever in rheumatic children by the addition of 3 eggs per day to the diet. It is noteworthy that of 14 cases occurring in the children of wealthy parents, 13 showed an idiosyncrasy or intolerance to milk or eggs.[8]

USE OF SALICYLATES

There is one other method by which it is possible to prevent the recurrence of rheumatic attacks and that is by the administration of salicylates immediately following a hæmolytic streptococcus infection. The manner in which this form of therapy was discovered is interesting. In 1929 Derick and Swift in Boston were looking for a substance which might prevent the occurrence of serum sickness after the treatment of pneumonia with horse serum and, noticing the similarity between serum sickness and rheumatic fever they thought that salicylates might be of value and found, after considerable trial and error, that if salicylates were given in doses of 90 grains a day, immediately following the administration of horse serum, that serum sickness could usually be prevented.[9] They however did not attempt to use this treatment in the prevention of attacks of rheumatic fever. But in 1930 Schlesinger, of the West Wickham Convalescent Home for Rheumatic Children, reviewing this work decided to try it in his rheumatic children and whenever they had an upper respiratory infection he would place them on a dose of salicylates for some weeks. In 1937 he made the statement that since this prophylactic treatment was introduced a recurrence in rheumatic children following an upper respiratory infection was a rarity and if an attack did occur it was very mild.[10, 11]

This work was of a purely clinical character and in 1941 Coburn repeated this work, doing careful bacteriologic and immunological studies. He had all his rheumatic children report if they had any respiratory infection, cultures were done and 90 grains of sodium salicylate a day were given and continued for 28 days, if the cultures were positive for hæmolytic streptococci. In 47 children so treated only one developed a rheumatic attack and he was a negro child who subsequently responded well to salicylate therapy and it is doubted if he took the prophylactic dose.[12]

He also showed that no antibody and therefore no precipitin occurs in these patients and thus proved that the action of salicylates is in the prevention of the formation of antibody.

This work has greatly added both to our knowledge of the disease and in demonstrating the action of salicylates, but I do not believe that this therapy will lend itself to general use and I feel that our greatest hope in the prevention of this disease and its sequelæ lies in the adequate and prolonged use of salicylates during a rheumatic attack and to follow this immediately by the prolonged prophylactic use of sulfadiazine.

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RÉSUMÉ

L'administration prophylactique de 0.50 gm. de sulfadiazine deux fois par jour empêche l'éclosion du rhumatisme articulaire aigu. Cette expérience a été faite chez 250,000 marin américains pendant les mois d'hiver. Les salicylates empêchent les récidives s'ils sont continués longtemps après une attaque de rhumatisme. Les sujets traités prophylactiquement par la sulfadiazine ont également été protégés contre la scarlatine et la méningite à méningite à méningocoque.

JEAN SAUCIER

THE MANAGEMENT OF PRE-ECLAMPSIA*

By Nicholson J. Eastman, M.D. and Philip P. Steptoe, M.D.

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IF a case of pre-eclampsia is to be managed with complete success, a number of objectives must be attained. Among these are: (1) Prevention of convulsions. (2) Prevention of residual hypertension. (3) Delivery with minimum trauma yet in a manner which will not handicap patient in future pregnancies (Cæsarean section). (4) Delivery of a child which survives.

In certain cases of pre-eclampsia, especially in patients near term, all four of these objectives may be served equally well by the same treatment, namely, prompt induction of labour; and no question of conflict between any two of them arises. In other instances, however, the attainment of certain of these desiderata may so conflict with the realization of another as to make it virtually impossible to gain all four objectives. For instance, if a patient develops severe pre-eclampsia two or three months before her expected date of confinement, prompt termination of pregnancy may seem indicated if objectives Nos. 1 and 2 are to be realized, but this course may well result in the delivery of a nonviable premature infant and consequent failure to attain objective No. 4. Again, when pre-eclampsia develops at such an early date, a long, closed cervix may make induction of labour extremely hazardous; and if in this case convulsions seem imminent, Cæsarean section may become almost mandatory. While it may therefore be impossible to attain all four of these objectives in every case, the extent to which we are able to do so is a rough gauge of our success in the management of this complication.

It is the purpose of the present study to review the experience of the Johns Hopkins Hospital with pre-eclampsia over the past two decades and to ascertain not so much the degree in which we have succeeded in attaining these objectives but the extent to which we have failed and why. Between January 1, 1924, and December 31, 1943, 2,418 cases of pre-eclampsia occurred among our prenatal cases. Approximately four-fifths of the patients were primigravidæ. The criterion used for the diagnosis of pre-eclampsia was the development, after the 28th week of pregnancy, of a systolic blood pressure of 140 mm. Hg. and/or a diastolic pressure of 90 mm. Hg., the hypertension to be maintained on at least two occasions, six hours or more apart. As may be seen in Table I,

TABLE I.

Incidence of eclampsia developing in cases of pre-eclampsia, and mortality rates in eclamptic and non-eclamptic groups. J.H.H., January 1, 1924 to December 31, 1943.

Total cases of pre-eclampsia—2,418	
Developed eclampsia 92 (3.8%)	Did *not* develop eclampsia 2,326 (96.2%)
Maternal mortality, 7 (7.6%)	Maternal mortality, 4 (0.2%)
Total infant mortality, 20 (21.7%)	Total infant mortality, 158 (6.8%)
Total number of convulsions 398 (Av. 4.3)	

among these 2,418 cases of pre-eclampsia under our surveillance, 92 instances of eclampsia developed, an incidence of 3.8%. These 92 eclamptic cases represent failures to attain the first objective in the management of pre-eclampsia, namely, prevention of convulsions. Although the great majority of these patients suffered only one to three convulsions, the gravity of these failures in general is made plain by the fact that 7 of the 92 mothers and 20 of the infants died, a maternal and fetal mortality rate of 7.6 and 21.7%, respectively. By contrast, in the 2,326 cases of pre-eclampsia in which convulsions did not develop, only 4 mothers (0.2%) and 158 infants (6.8%) succumbed. A total of 398 convulsions were suffered by these 92 eclamptic patients, an average of 4.3 each. Moreover, three women experienced 42, 41 and 40 convulsions, respectively; and three additional, 25, 23, and 22. There were five cases of post-eclamptic psychoses.

But the gravity of the disease eclampsia is well known and it is quite unnecessary to adduce figures such as the above in order to substantiate the fact that the development of convulsions in a case of pre-eclampsia under observation is a grave catastrophe and represents a grievous failure of prenatal care. It would seem obvious, therefore, that the first objective in the management of pre-eclampsia is the prevention of eclampsia. If this be true, it becomes important to inquire into the causes of our failure to prevent this costly complication in the 92 cases.

* Read at the Seventy-fifth Annual Meeting of the Canadian Medical Association, Toronto, May 25, 1944; and before the Boston Obstetrical Society, Boston, April 18, 1944.

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Since the treatment of pre-eclampsia has varied considerably over the twenty-year period considered, our 2,418 cases of this disease have been divided into four groups by five-year intervals and again subdivided according to race. The results as shown in Table II bring out two

TABLE II.

Incidence of eclampsia developing in cases of pre-eclampsia, J.H.H., January 1, 1924 to December 31, 1943, by five-year periods, and by race.

	Cases of pre-eclampsia		*Cases of eclampsia*		*% eclampsia*	
Period	*White*	*Black*	*White*	*Black*	*White*	*Black*
1924-1928	104	134	12	19	11.5	14.2
1929-1933	294	269	7	13	2.4	4.8
1934-1938	299	246	10	16	3.3	6.5
1939-1943	512	560	2	13	0.4	2.3

main facts. In the first place, although the incidence of pre-eclampsia was approximately the same in the white and negro races, twice as many pre-eclamptic negresses developed eclampsia as did white women, the percentages being 5.0 and 2.6, respectively. The higher incidence of eclampsia in the negresses of the series is probably the result of several factors but is due chiefly, in our opinion, to poorer co-operation on the part of these women. Thus, failure to report early and regularly at the prenatal clinic, laxity in obeying dietary instructions and delay in reporting symptoms, are more common lapses in negresses than in white patients.

The second fact shown by Table II is the marked reduction in the incidence of eclampsia in this series over the twenty-year period. Indeed, between 1924 and 1928, pre-eclamptic patients under our care were ten times as likely to develop convulsions as they were in the last five-year interval. What was responsible for the high incidence of eclampsia in this early period? And what, specifically, were the causes of our failure to prevent convulsions in all these 92 pre-eclamptic women? In an effort to answer these questions the records of these 92 cases have been analyzed and the apparent causes of the failures listed. The results are shown in Tables III and IV, grouped according to whether the apparent error was one of prognosis or of treatment.

To a group of experienced obstetricians, the lessons to be drawn from these lists may seem very trite platitudes. On the other hand, the wide variety of causes responsible for these failures illustrate so clearly the everlasting vigi-

TABLE III.

The causes, on retrospect, of failure to prevent eclampsia in 92 cases of pre-eclampsia.

Errors of prognosis	
1. Failure to evaluate gravity of sudden weight gain	16
2. Failure to evaluate gravity of *moderate* deviations from normal (B.P., albuminuria, œdema) in young primigravidæ	15
3. Failure to evaluate gravity of symptoms (headache, epigastric pain, vomiting)	6
4. Failure to evaluate gravity of *moderate* deviations from normal (B.P., albuminuria, œdema) in twin pregnancy	3
5. Failure to evaluate gravity of high diastolic pressure	3

TABLE IV.

The causes, on retrospect, of failure to prevent eclampsia in 92 cases of pre-eclampsia.

Errors of management	
1. Failure to sedate in labour	29
2. Failure to sedate postpartum	19
3. Failure to hospitalize earlier	19
4. Failure to deliver promptly	15
5. Failure to take blood pressure in labour	13
6. Failure to see every week in last month	10
7. Failure to follow blood pressure postpartum	9
8. Failure to sedate on admission	9

lance and wary alacrity necessary if pre-eclampsia is to be managed successfully, that consideration of the tables would seem worth while. As shown in Table III, the most common error was failure to evaluate the gravity of sudden weight gain in the latter months of pregnancy. During the earlier years covered by the study, many patients gained as much as 11 pounds in one week, or 18 pounds in four weeks, without attracting particular attention. Despite these gains they were allowed to return home, only to be brought back to the hospital within a few days in convulsions. During recent years the grave significance of sudden weight gain in association with hypertension is well known, but during earlier years the significance of this sudden water-logging of the body was not recognized and proved a costly oversight. Another common error in prognosis was failure to take the whole picture of pre-eclampsia into consideration, emphasis being laid too largely on a rigid criterion of blood pressure. A blood pressure of 145/90, associated with substantial albuminuria and œdema in a 17-year old primigravida is more ominous than a blood pressure of 160/110 in an older woman without these associated findings. In our experience, headache, epigastric pain and vomiting are late signs of oncoming eclampsia and must be treated intensively if convulsions are to be prevented.

During the first half of the period under survey, ten patients developed eclampsia because

they were not seen every week during the last month. The findings on all of these women had been normal at their last prenatal visit, but 15 to 25 days later they were brought to the hospital with convulsions. These cases emphasize the importance of the well-known rule that it is obligatory to see prenatal patients every week during the last month if eclampsia is to be avoided. It is sometimes said that eclampsia may develop with such rapidity that the condition may ensue even though the findings four or five days previously were normal. Although cases of this type may occasionally occur, they must be very rare, since in our entire series only two such instances, possibly three, were observed. While we are not prepared, therefore, to say that eclampsia is an entirely preventable disease, it should be almost so, provided meticulous care is exercised.

The inferences to be drawn from the other causes of failure are plain enough and, with two exceptions, require no comment. The problem of sedation in labour, and of prompt delivery, however, do demand special consideration. The majority of the cases of eclampsia in this series developed in labour and most of these at or near full dilatation. It is evident, therefore, that in women already suffering from pre-eclampsia labour pains may occasionally provoke such stimulation of the central nervous system as to initiate convulsions. Accordingly, to give pre-eclamptic patients in labour moderate to heavy sedation is altogether rational; but this program carries with it the obvious drawback that drugs given for this purpose often inhibit labour. There is one anti-convulsive drug, however, which does not cause an inhibitory effect on labour, namely, magnesium sulphate, and during the past two years we have been exploring the possibilities of this drug with dosages pushed to higher levels than have hitherto been recommended.

The efficacy of magnesium sulphate as a central nervous system depressant and as a vasodilator is well known, and is substantiated by a large amount of experimental and clinical evidence. Thus, it is widely considered the most efficient drug in allaying the convulsions of tetanus. As a vasodilator it has been employed extensively in the treatment of hypertension and uræmia. In 1925 Blackfan and Hamilton observed that intravenous injections of magnesium sulphate produced a favourable influence by lowering the blood pressure and increasing the flow of urine in children suffering from hæmorrhagic nephritis. These observations have been confirmed by numerous workers and more recently Haury has shown that intravenous injection of magnesium sulphate produce a marked dilatation of the splanchnic organs, including the kidneys. Since both the sedative and vasodilator effects of magnesium sulphate are urgently to be desired in the treatment of eclampsia and pre-eclampsia, it is not surprising that this drug has been widely employed in the management of these conditions over the past twenty years. In the main, however, the dosages used have been very small, the total amount administered intramuscularly being limited as a rule to 10 gm. It has been shown by many workers that such dosage is not adequate to produce the full therapeutic effect of this agent. What effects may be expected from magnesium sulphate by the parenteral route in several times the dosages heretofore used? More important is the question how large doses of this drug may be employed with complete safety.

In evaluating the safety of magnesium sulphate it is important to recall that toxic signs and symptoms do not develop until the serum magnesium reaches 10 to 12 mgm. per 100 c.c. At or near this level the knee jerks disappear. Between 12 and 15 mgm. per 100 c.c., respirations are likely to cease and when the serum magnesium concentration exceeds 15 mgm. per 100 c.c., cardiac action may stop and death ensue. We have now employed this drug in 15 cases with rather large total dosages and believe it is possible to administer magnesium sulphate intramuscularly in many times the dosage usually employed without approaching hazardous levels of serum magnesium. On the basis of our experience, which includes more than 300 serum magnesium determinations done at various times after the administration of the drug, we feel in the first place that it is entirely safe to administer 10 gm. intramuscularly as an initial dose followed by 5 gm. every six hours. We have continued this for as long as two to three days with total dosages reaching 60 to 110 gm. and never have we observed a serum magnesium level above 7 mgm. per 100 c.c. Usually the range obtained by such dosage is between 3 and 6 mgm. per 100 c.c. In the second place, it is our impression that such levels of magnesium contribute substantially to a lowering of the

blood pressure and prevention of convulsions. The main place of this drug in the management of pre-eclampsia, in our opinion, is in protecting patients with this complication against convulsions during labour. If labour is to be induced we often start the magnesium sulphate injections several hours before the procedure is carried out.

There are two main reasons for prompt delivery, if possible, in pre-eclampsia, namely, prevention of convulsions and prevention of residual hypertension. It is, of course, well known that the longer a pre-eclamptic patient is carried, the more likely she is to have residual hypertension. This fact has been brought out convincingly on our own material by Peckham, as shown in Table V. In keeping with the inference to be drawn from this table we have endeavoured to limit the duration of any given pre-eclamptic episode to a minimum; the extent to which we have been able to attain this objective is shown in Table VI. It will be noted that among the

TABLE V.

Incidence of residual hypertension following pre-eclampsia in 215 primiparæ according to time elapsing between onset of toxæmia and delivery. (From data collected on present material by Peckham).

Duration of pre-eclampsia (weeks)	*Total patients*	*Residual hypertension*	*%*
1 - 2	115	19	16.5
3 - 4	47	9	19.2
5 - 6	18	7	38.9
7 - 8	11	7	63.6
9 - 12	24	17	70.8

TABLE VI.

Days of hospitalization prior to delivery in cases of pre-eclampsia, 1939-1943.

		%
Cases of pre-eclampsia in period	1,072	100.0
Admitted because of pre-eclampsia before onset of labour	510	47.6
Admitted in labour	562	52.4

Days of hospitalization in 510 pre-eclamptic cases admitted before onset of labour.

Days	*Cases*	*%*
1 - 5	431	84.5
6 - 10	46	9.0
11 - 15	16	3.1
16 - 20	9	1.8
21 - 25	5	1.0
26 - 30	3	0.6

510 patients with pre-eclampsia who were not in labour on admission, termination of pregnancy ensued within 5 days in 431, or in about 85%. This salutary result in these 431 cases came about in the following ways: spontaneous onset of labour, 185; artificial rupture of membranes, 142; medical induction, 37; Cæsarean section, 66; hysterotomy, 4; hysterectomy, 1; and vaginal abortion, 1.

But if it be granted that early termination of pregnancy in pre-eclampsia is desirable, how is it best to be done? What is the place of induction of labour in the management of pre-eclampsia, and when, if ever, is Cæsarean section indicated? As may be seen in Table VII,

TABLE VII.

Incidence of induction of labour for pre-eclampsia by five-year periods, January 1, 1924 to December 31, 1943.

Period	*Cases of pre-eclampsia*	*Inductions*	*%*
1924-1928	238	41	17.2
1929-1933	563	82	14.6
1934-1938	545	69	12.7
1939-1943	1,072	167	15.6

the frequency with which we have induced labour for pre-eclampsia over the past two decades has remained fairly constant, in the neighbourhood of 15%. During the past five years the method employed for the induction of labour has been artificial rupture of the

TABLE VIII-A.

Analysis of 167 inductions of labour by artificial rupture of membranes for pre-eclampsia (1939-1943).

		%
Total cases	167	100.0
Stage of pregnancy:		
At term (39 to 40 weeks)	138	82.6
35 to 38 weeks	23	13.8
Under 35 weeks	6	3.6
Duration of labour:		
Under 10 hours	108	64.7
10 to 19 hours	43	25.7
20 to 29 hours	8	4.8
30 hours and over	6	3.6
Unknown	2	1.2
Complications:		
Eclampsia (fatal)	1	0.6
Failed induction	3	1.8
Intrapartum infection	12	7.2
Uterine inertia	14	8.4
Prolapse of cord	0	0.0

TABLE VIII-B.

Analysis of 167 inductions.

Fetal mortality	*Infants*	*Still-born*	*Normal delivery*	*Total infant mortality %*
Mature (2,500 gm.+)	138	0	1	0.7
2,000 to 2,499 gm.	25	3	0	12.0
1,500 to 1,999 gm.	5	1	1	40.0
1,000 to 1,499 gm.	3	1	1	66.6
Total	171	5	3	4.7

Maternal mortality	*Cases*	*Deaths*	*%*
	167	1 (eclampsia)	0.6

membranes. The results achieved are shown in Table VIII, A and B. It will be noticed in particular, that the vast majority of these cases, namely, 82.6%, were at term, whereas only 3 out of the 167, or 3.6%, were less than 35 weeks pregnant. While the duration of labour was satisfactory in most cases, there were 6 instances in which it lasted for 30 hours or longer. Four serious complications developed in the induction series, namely, 1 case of eclampsia which proved fatal and 3 instances in which the induction was unsuccessful. The details of these cases are as follows:

CASE 1

U. 251,366. Registered, coloured, 19-year old primigravida, E.D.C. 6/12/42; twin pregnancy. Eight visits to prenatal clinic. No deviations from normal until eighth visit, 5/28/42, when B.P. was 150/100, albumin trace, weight gain 4 pounds in last week; slight œdema, no symptoms. Admission to hospital at 11.00 a.m., 5/28/42.

During first eight hours in hospital, B.P. rose to 190/110; albumin 2+; headache, vomiting, epigrastric pain. Paraldehyde 20 c.c. q. 4 h. per rectum.

Twenty-five hours after admission (12 noon, 5/29/42), B.P. 170/110. Cervix 1 cm. dilated; half effaced; head at spines. Membranes stripped back and *ruptured artificially* (12.30 p.m., 5/29/42).

Latent period, 3 hours. Marked uterine inertia with 29-hour first stage, B.P. remaining 170/110, albumin 4+. Restlessness changed to apathy, then to semi-coma; anuria developed; then generalized convulsion at 6.00 p.m., 5/30/42 (30 hours after induction).

Following convulsion, B.P. fell to 110/70; pulse 160 to 170 with picture of collapse; semi-coma. After 2½ hour second stage, delivery under sodium pentothal anæsthesia of stillborn, macerated twins at 10.50 p.m., 5/30/42. Only 0.5 gm. of sodium pentothal was used. Despite transfusion with whole blood and plasma, B.P. fell. Marked œdema of lungs; temperature 104.3° F.; pulse 170.

Death occurred at 6.48 a.m., 5/31/42, eight hours postpartum. No autopsy.

CASE 2

U. 225,041. Coloured, 37-year old para VII, 34 weeks' pregnant. B.P. 205/120. (No information about previous B.P., but fundi were normal and B.P. returned to normal after delivery. Therefore, presumably pre-eclampsia).

Despite long, closed cervix and floating head, membranes ruptured artificially at 7.03 p.m., 3/19/41.

No labour after 48 hours. Cæsarean section hysterectomy. Satisfactory convalescence.

CASE 3

U. 249,181. Coloured, 34-year old para I, 35 weeks' pregnant. B.P. 175/110. Marked œdema, weight 215 pounds.

Cervix half effaced, soft, 2 cm. dilated; head 2 fingerbreadths above spines. Membranes artificially ruptured at 10.00 a.m., 3/6/42.

No labour after 36 hours; temperature 100.6° F. Waters' Cæsarean section. Satisfactory convalescence.

CASE 4

U. 257,477. Coloured, 19-year old primigravida, at term. B.P. 160/120.

Cervix long and firm, 1 cm. dilated, head 3 fingerbreadths above spines. Membranes ruptured artificially at 12 noon, 3/9/43.

After latent period of 25 hours, irregular pains began. Marked uterine inertia during next 11 hours, no progress, temperature rising to 102° F.

Waters' Cæsarean section. Satisfactory convalescence.

On retrospect, it is plain that the patient who died of eclampsia might well have been saved by Cæsarean section. The twin pregnancy, the fulminating nature of the toxæmia as manifested by rapid development of symptoms and further rise of blood pressure after admission, all point to the fact that the interests of the patient might have been served better had abdominal delivery been accomplished at the time when the membranes were ruptured. Again on hindsight it seems plain that in at least two of the three failed inductions the error lay in attempting to induce labour through a cervix which was wholly unfavourable for the onset of labour.

These three cases of failed induction, in which we were forced, it seemed, to resort to Cæsarean section because of the threat of intrapartum infection, and the above case in which death ensued because of eclampsia developing in the course of a 29-hour first stage, raise the question of Cæsarean section and its place in the management of pre-eclampsia. We believe that this operation has an important part to play in the treatment of this complication, a part which

TABLE IX.

Incidence of Cæsarean section done because of pre-eclampsia, by five-year periods.

Period	*Cases of pre-eclampsia*	*Cæsarean section*	*%*
1924-1928....	234	7	3.0
1929-1933....	563	13	2.3
1934-1938....	545	44	8.1
1939-1943....	1,072	71	6.6
Total.....	2,414	135	5.6

TABLE X-A.

Analysis of 71 Cæsarean sections done because of pre-eclampsia (1939-1943).

Incidence	*Cases*	*%*
Total cases of pre-eclampsia in period	1,072	100.0
Total Cæsarean sections done.....	105	9.8
Cæsarean sections done because of pre-eclampsia.....	71	6.6
Parity:		
Para 0.....	56	79.0
1.....	3	4.2
2.....	4	5.6
3.....	3	4.2
4+.....	5	7.0
Blood pressure:		
Average systolic 167.7 mgm. Hg.		
Average diastolic 111.6 mgm. Hg.		
Blood pressure rising.....	37	52.1
Blood pressure labile.....	41	57.7

may best be summarized by saying that it serves as a much needed complement to induction. As shown in Table IX, the frequency with which we have performed Cæsarean section because of pre-eclampsia has doubled over the 20-year period. But as illustrated in Table X, A to E,

TABLE X-B.

Analysis of 71 Cæsarean sections.

Albuminuria:	*Present*	*Range*	*Average in 39 cases*
	64 (90.1%)	1-15 gm.	4.9
Weight gain:	Average in 61 cases, 25.9 lbs.		
Œdema	*Cases*	*%*	
	58	81.7	
Symptoms:			
Headache	40	56.3	
Vomiting	9	12.7	
Epigastric pain	9	12.7	
Retinal changes: (Examined 62 or 87.3%)			
No changes	33	53.2	
1+ (Spasm of arterioles)	13	21.0	
2+ (Papillœdema, hæmorrhage or exudate)	8	12.9	
3+ (Any two of three conditions just above)	6	9.7	
4+ (Detachment of retina)	2	3.2	

TABLE X-C.

Analysis of 71 Cæsarean sections.

Stage of pregnancy. (Comparison between induction and Cæsarean section series).

	Induction (167 cases)			*Cæsarean Section (71 cases)*		
	Cases	*%*		*Cases*	*%*	
At term	138	82.6		15	21.1	
35 - 38 weeks	23	13.8	17.4	35	49.3	78.9
Under 35 weeks	6	3.6		21	29.6	

TABLE X-D.

Analysis of 71 Cæsarean sections.

Condition of cervix	*Cases*	*%*
Effacement (noted in 61 cases).		
None	47	77.1
Partial	13	21.3
Complete	1	1.6
Dilatation (noted in 65 cases)		
None	49	75.4
1 cm	15	23.1
2 cm. (in labour; inertia)	1	1.5
Station of presenting part (noted in 70 cases)		
Floating	33	47.1
3 Fingerbreadths above spines	16	22.9
2 Fingerbreadths above spines	5	7.2
1 Fingerbreadth above spines	8	11.4
At spines	8	11.4

TABLE X-E.

Analysis of 71 Cæsarean sections. (75 infants).

Fetal mortality	*Infants*	*Stillborn*	*Normal delivery*	*Total infant mortality %*	*Corrected for premature separation*
Mature (2,500 gm.+)	26	1*	0	3.8	0.0
2,000 - 2,499 gm	25	0	2	8.0	8.0
1,500 - 1,999 gm.	13	2*	3	38.5	23.1
1,000 - 1,499 gm.	11	0	4	36.4	36.4
Total	75	3	9	16.0	12.0

*Fetal death before operation due to premature separation of the placenta. In five other cases Cæsarean section was performed because of this indication in addition to pre-eclampsia. One was a twin pregnancy. Of the six infants involved, one died in the neonatal period while five were discharged in good condition.

Maternal mortality	*Cases*	*Deaths*	*%*
	71	1	1.4

the operation has been reserved for a rather definite type of case, namely, the one in which the process appears to be fulminating but in which conditions are not favourable for induction of labour. Thus, the average blood pressure of the group during the 24 hours before operation was 167/111; in 52% it was described as rising; and in 57% it was noted as labile, to us a bad sign particularly in regard to fetal prognosis (Table X-A). Nine out of ten of the patients showed albuminuria and in more than half of them it was massive; over 80% of the group showed œdema, while a substantial proportion had pathognomonic symptoms and retinal changes (Table X-B).

The second main characteristic of the group was unsuitability for induction of labour. Thus, while the great majority of our induction series (82.6%) were at term, only a fifth of the Cæsarean section cases had reached this stage. Conversely, whereas only 17.4% of the induction series had pregnancies of 38 weeks or less, the great majority of the Cæsarean section cases (78.9%) fell into this earlier group (Table X-C). It is well known that the ease and certainty with which labour can be induced is related, in general, to proximity to term and it might be expected that this Cæsarean group (only one-fifth of whom were at term) would be less suitable for induction than the 167 induced cases, the great majority of whom had reached, approximately, their expected date of confinement. This supposition is confirmed

when it is noted that in 77% of the Cæsarean series there was no effacement of the cervix, in 75% no dilatation and that in about half the cases the presenting part was floating (Table X-D).

There was one death in the Cæsarean section series, as follows:

CASE 5

U. 287,822. Coloured 16-year old primigravida at term, referred from Calvert County, Md. B.P. 190/130; albumin 10 grams per litre; history of 74 pounds weight gain in pregnancy; massive œdema, eyes nearly swollen shut and œdema of thighs so marked as to interfere with rectal examination; nearly blind; headache, epigastric pain and vomiting for 3 days.

After 4 hours of observation and sedation, Cæsarean section was done at 11.30 p.m., 3/29/43. While anæsthesia was being induced with sodium pentothal, and after 0.75 gm. had been given, the patient suffered either an atypical convulsion or laryngospasm. The sodium pentothal was stopped and drop ether given for the entire duration of the operation.

After operation, persisting coma and œdema of lungs. B.P. 175/95 but fell progressively.

Death at 11.35 a.m., 3/30/43 with picture of overwhelming œdema of lungs.

Autopsy showed extreme œdema of lungs; eclamptic liver.

TABLE XI.

Fetal mortality

White

Period	*Babies*		*Still-born*	*%*	*Normal delivery*	*%*
(1)	Mature...	102	9	8.8	1	1.0
1924-1928	Premature	7	2	28.6	1	14.3
(2)	Mature...	282	11	3.9	3	1.1
1929-1933	Premature	14	3	21.4	1	7.1
(3)	Mature...	287	6	2.1	1	0.3
1934-1938	Premature	25	1	4.0	4	16.0
(4)	Mature...	475	10	2.1	3	0.6
1939-1943	Premature	52	4	7.7	7	13.5

Black

Period	*Babies*		*Still-born*	*%*	*Normal delivery*	*%*
(1)	Mature...	125	15	12.0	2	1.6
1924-1928	Premature	13	4	30.8	1	7.7
(2)	Mature...	253	17	6.7	3	1.2
1929-1933	Premature	25	1	4.0	5	20.0
(3)	Mature...	243	12	4.9	4	1.6
1934-1938	Premature	13	2	15.4	2	15.4
(4)	Mature...	476	18	3.8	4	0.8
1939-1943	Premature	107	13	12.1	8	7.5

Period	*1*	*2*	*3*	*4*
Mature.....	11.9	6.4	4.3	3.7
Premature..	40.0	25.6	23.7	20.1

Although some other type of management might have saved this patient, she presented an extreme degree of pre-eclampsia and the outcome would very possibly have been the same no matter what the treatment after admission to the hospital. Obviously, she represented a case of gross neglect prior to admission. The result for the baby was about the same in the induction and Cæsarean section cases, although for infants under 2,000 gm. abdominal delivery seemed to give somewhat better results (Table X-E).

It is gratifying to note, as shown in Table XI, that the infant mortality in pre-eclampsia has fallen substantially over the 20-year period. This is probably the result of many factors among which may be enumerated: (1) Reduction in incidence of eclampsia; (2) elimination of bag and bougie induction, a popular procedure in the earlier two periods; (3) more liberal use of Cæsarean section in cases unsuitable for induction; (4) avoidance of traumatic operative delivery; (5) vitamin K, and (6) better care of premature infants.

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THE USE OF PENICILLIN IN LUDWIG'S ANGINA

By Surgeon Lieutenant David M. Bean and Surgeon Commander Walter C. MacKenzie, R.C.N.V.R.

LUDWIG'S angina is a disease entity which has long been considered a serious one and has frequently resulted in a fatal outcome.[1] Thomas[13] in 1908 emphasized the fact that most of the deaths were due to respiratory obstruction and not to sepsis, and advocated early decompression of the involved space under local anæsthesia. However, the mortality varying from 25 to 54% was not materially altered in the following 25 years.

Taffel and Harvey[12] in an instructive report in 1942 quoted a considerably lowered mortality, approximately 5% in a series of 45 cases treated by immediate operation in every instance. These authors affirm that "nothing should replace immediate surgical decompression of the submandibular space".

The hæmolytic streptococcus is the offending organism in a high percentage of Ludwig's angina. Williams[16] reports 72%. Pneumococcus, staphylococcus, and various anaerobes are also found.[12, 15, 16, 17] For this reason the sulfonamide group has been advocated as an adjunct to surgery and in some instances has been used alone in the treatment of this disease with varying success.[2, 6, 10, 14, 15]

Herrell[7] has successfully used penicillin for extensive oral cellulitis when sulfonamide therapy failed. His 1943 report includes two cases (No. 4 and No. 7) which are characteristic Ludwig's angina. A further report[8] embraces a total of six patients whose oral cellulitis endangered life.

With the bacterial etiology in mind, cases of Ludwig's angina in our care have been treated with penicillin ever since it was made available to us in 1944. We have not relaxed our careful observation of these patients and have at all times had a tracheotomy set immediately available. We have been prepared, if no improvement was noted in the first twenty-four hours, or if the progress of the disease warranted it, to carry out surgical drainage without delay. However, early surgery has not been necessary in the cases treated so far. The case histories follow.

CASE 1

G.H., a 23-year old naval rating was admitted to R.C.N. Hospital, Halifax, on December 11, 1944, complaining of a painful swollen jaw. He gave a history of having his left lower third molar extracted on December 8. On December 10 he awakened with a moderate trismus and swollen left cheek.

On admission, examination revealed an inflammatory mass 3 inches in diameter in the left cheek anterior to the angle of the mandible. He was unable to separate his incisors more than one inch. The site of the tooth extraction presented a dirty red brown fossa with no visible discharge. The left anterior tonsillar pillar was inflamed, in addition to the adjacent buccal mucosa. The lymph nodes in the left superior cervical and left submaxillary areas were enlarged and tender. The remainder of the physical examination was entirely negative. The temperature on admission was 102° F., pulse 110 and respirations 24 per minute.

He was given sulfadiazine by mouth, 2 gm. stat, then 1½ gm. q. 4 h. x 6, hot oral irrigations q. 4 h. and continuous heat to the affected area.

On December 12 at 8.00 a.m. his temperature, trismus and œdema were unchanged. During the subsequent six hours he developed a fulminating Ludwig's angina. Œdema rapidly enveloped the left submaxillary area, oral floor, right submaxillary region, tongue and left fauces. By 10.00 a.m. he was laboriously expectorating a profuse tenacious slime. At noon his tongue was held snugly against the roof of the mouth by œdema. Trismus increased and he experienced some dyspnœa which a high Fowler's position alleviated at once. At 4.00 p.m. the lingual ducts were bulging over the lower occlusal margin. The grossly œdematous tongue could protrude just one-quarter of an inch anterior to the incisors. A hot, tense, indurated swelling involved the left cheek, both submaxillary areas, submental region and oral floor. His temperature was 103.8° F., pulse 110, respirations 24; white cell count 21,900; sedimentation rate 46 mm./first hour; urinalysis negative except for a faint trace of albumin and an occasional polymorphonuclear cell. A smear of the tooth socket revealed many mixed organisms including Gram-positive cocci, a few spirillæ and fusiform bacilli. Culture resulted in a moderate growth of the usual oral flora.

Penicillin therapy was started at 5.00 p.m., with 20,000 Oxford units intravenously, then 10,000 units every hour by a continuous intravenous drip of 5% dextrose in saline. General measures included hot saline oral irrigations every hour, continuous heat to the affected parts, high Fowler's position and sedatives p.r.n. In addition, an emergency tracheotomy set and oxygen administrative apparatus were kept at the bedside.

During the first six hours of penicillin therapy, the œdema slowly increased. At 11.00 p.m. he could separate his incisors only one-quarter of an inch. Hourly observation by a medical officer, and a special nursing staff, enabled us to closely follow his clinical condition.

At the end of twenty-four hours (December 13), he was symptomatically improved, having much less dysphagia. The œdema in the oral floor had subsided slightly. Penicillin was continued, with a dosage of 180,000 units daily. At 2.00 p.m. on December 14 he began to regurgitate fluids taken by mouth, through his nares. Eventually 60% of such fluids were being regurgitated and he abandoned all effort to swallow. In spite of this his clinical condition seemed improved. His temperature varied throughout the day from 99 to 101° F., pulse 80 to 110 and respirations 20 per minute.

At the end of seventy-two hours, on December 15, a profuse foul purulent discharge was noted coming from the tooth socket. The œdema decreased during the next few hours, most markedly in the oral floor. The temperature varied from normal to 101° F., pulse 84 to 100 and respirations 22 per minute.

On next two days the œdema rapidly subsided in all involved areas. A copious purulent discharge persisted from the tooth socket. The regurgitation ceased. Swallowing was easily performed. The temperature fell to 99° F., the leucocytes to 5,250 and the sedimentation rate to 24 mm./first hour. Penicillin was now discontinued. A total of 940,000 Oxford units was administered.

Examination on December 18 showed the floor of the mouth to be almost normal. There was some residual swelling in the left submaxillary area and left cheek. The temperature was normal on December 19 and remained thus for the rest of his hospitalization. Ten days after the onset of his Ludwig's angina, the swelling had completely subsided and the tooth socket healed.

CASE 2

S.R., a 30-year old naval rating was admitted to sick bay on December 16, 1944, twenty-four hours after his left lower third molar was extracted. He appeared acutely ill, and complained of moderate malaise and a painful swelling over the left side of the mandible. During the four hours following admission, he developed a diffuse swelling in the left submaxillary and submental areas, accompanied by œdema of the floor of the mouth, tongue and right submaxillary region. The remainder of the physical examination was negative. The temperature on admission was 102° F., pulse 110 and respirations 22 per minute.

He was treated with hot saline oral irrigations and sulfadiazine, 2 gm. stat. and 1 gm. q. 4 h. During the evening the swelling slowly progressed and by 10.00 p.m. he complained of inability to swallow fluids. He did not respond to sulfonamide therapy. Therefore on December 17 he was transferred to R.C.N. Hospital, Halifax.

On admission to hospital he presented a typical picture of an acute Ludwig's angina. A diffuse woody

induration involved both submaxillary areas and the oral floor was grossly œdematous. He could separate the occlusal incisor margins three-quarters of an inch with difficulty. Protrusion of his tongue was limited and his breath was very foul. A grey fibrinous adherent plaque covered the elevated ducts in the oral floor. His temperature was 102.2° F., pulse 120, respirations 22 per minute; white cells 16,500; sedimentation rate 12 mm./first hour; urinalysis negative save for a faint trace of albumin and sugar, an occasional polymorphonuclear cell and a rare, finely granular cast. A culture from the tooth cavity subsequently showed a moderate pure growth of hæmolytic streptococci, Lancefield A.

Penicillin therapy was instituted immediately, in the same dosage as Case 1, along with the general measures outlined above. After twenty-four hours of penicillin therapy he was symptomatically improved and swallowing more easily. The temperature dropped to 101° F. and the white blood cells to 10,600. The sedimentation rate increased to 80 mm./ first hour.

During December 19 his condition steadily improved. The temperature was 99 to 101° F., the white cells 8,100 and the sedimentation rate 60 mm./first hour. On December 23, his temperature became normal and continued thus for the duration of his stay in hospital.

Penicillin was discontinued on December 24 after a total of 1,025,000 Oxford units had been given. He felt perfectly well, although there was still some swelling demonstrable in the left masseter region and a corresponding slight degree of trismus. The leucocytes were now 7,000 and the sedimentation rate 40 mm./first hour. By January 2, 1945, his white cell count and sedimentation rate were normal, the tooth socket healed and the trismus completely subsided.

CASE 3*

L.G., a 21-year old naval rating was admitted to R.C.N. Hospital, Sydney, N.S., on August 27, 1944, complaining of soreness and slight swelling in the left submaxillary area. The soreness had been present for two weeks. The swelling appeared three days prior to admission.

His admission temperature and pulse rate were normal. During the subsequent twelve hours the pain increased. The œdema rapidly spread across the oral floor and involved the left submaxillary region, producing a massive brawny induration about the upper neck and mandibular areas. The swollen tongue was forced to the right and superiorly against the hard palate. Swallowing became impossible. There was no dyspnœa noted.

Penicillin therapy was started, 10,000 units by continuous intravenous drip q. 3 h. for 48 hours, then 40,000 units daily for a total of 11 days' therapy (520,000 units).

Subjective and objective improvement was first noted twenty-four hours after penicillin therapy commenced and there was a steady regression of the swelling from that time onwards.

A localized fluctuant mass presented in the left submandibular area on September 4. This was incised and two drams of purulent material drained; when cultured this proved to be sterile.

Penicillin was discontinued on September 5. The temperature remained normal but a slight discharge persisted from the incision for sixty days. At this time the sinus was explored and a maze of sinuses, found during operation, was excised *in toto*. The wound promptly healed.

CASE 4

R.D.H., an 18-year old naval rating was admitted to R.C.N. Hospital, Halifax, on April 4, 1944, with a fractured left ascending mandibular ramus and an abrasion under the point of his chin, which he had suffered on March 31.

On April 5 he complained of malaise as his temperature steadily rose to 100.2° F. During the night the left submaxillary area became grossly swollen. Involvement of the oral floor quickly ensued.

On the next day, the tongue was lifted towards the hard palate. Sulfadiazine gm. 2 was given and therapy then discontinued pending the administration of penicillin. The temperature remained at 100° F., pulse 96, white blood cells 21,700. The urinalysis was entirely negative.

Penicillin was procured and therapy started on April 7, with 20,000 units intravenously, then q. 3 h., intramuscularly. A culture taken from the chin abrasion subsequently resulted in a very light growth of an indifferent streptococcus and *S. viridans*.

The sublingual œdema dramatically subsided on April 8. The temperature fell to normal and the white cell count to 13,800. The patient was greatly improved. Penicillin was continued with 15,000 units q. 3 h. intramuscularly until 220,000 units had been given.

On April 9 the submaxillary swelling gradually decreased. A moderate trismus persisted. The white cells fell to 8,200. In this case the convalescence was slow. Fifteen days elapsed before all clinical œdema subsided and the patient was fit for discharge.

CASE 5*

J.F.B., a 44-year old naval lieutenant was admitted to Rideau Military Hospital, Ottawa, on January 27, 1944, complaining of chills, dysphagia and a tender mass in the right side of his neck. On January 17 he experienced a sore throat. This was followed by the appearance of two small lumps in his right digastric triangle on January 24. On January 25 he began to suffer chills as the lumps rapidly enlarged. The whole right side of the neck became swollen and tender.

Thirteen hours after admission the mass was incised under local anæsthesia but no pus was found. Sulfadiazine therapy was discontinued because of gross hæmaturia. On January 31, six days of penicillin therapy were started with a dosage of 10,000 units q. 2 h., intramuscularly. On February 2 pus drained from the wounds. A culture of this grew pure hæmolytic streptococci. By February 8 the discharge was sterile and the cervical mass had subsided.

On February 13 the left side of the neck became similarly involved. When sulfathiazole failed to control the infection, 300,000 units of penicillin were given using the same dosage as before. An immediate response was observed and the infection appeared to regress. However, on February 19, swelling again recurred in the left neck and the entire anterior aspect of the neck became swollen. The oral floor became œdematous and the tongue was elevated. The patient experienced difficulty in swallowing fluids. Penicillin therapy was again instituted on February 27. A fluctuant mass just inferior to the left mandibular angle was drained under local anæsthesia on February 23. Five days later penicillin was discontinued. Eighteen days elapsed before his clinical condition warranted discharge from hospital.

Comment.—A diagnosis of Ludwig's angina should, as Thomas[13] maintains, be reserved for a virulent cellulitis arising in the submaxillary region and rapidly involving the contiguous connective tissues of the neck and then the oral floor and pharynx, thus endangering the life of the patient. The condition as described by Ludwig[1] is rarely seen now because of early

* Reported by courtesy of Surgeon Lieut. Commander E. Hitchin, R.C.N.V.R.

* By kind permission of the Officer Commanding, Rideau Military Hospital, Ottawa, and courtesy of Surgeon Commander W. Keith Welsh, Consultant Surgeon, R.C.N.

surgical intervention. The key to the diagnosis is the recognition of sublingual swelling, although the cellulitis may have arisen in either the oral floor or in the submaxillary region.

In this series, cases 1, 2, 3 and 4 are typical Ludwig's angina. Case 5 is representative of one of the clinical pictures over which the Nelaton and Delorme factions waged so much controversy. In the earlier stages, case 5 would never have been confused with Ludwig's angina, but on the twenty-sixth day of the disease, all criteria of the diagnosis were fully satisfied.

SUMMARY

In the early stages of Ludwig's angina, penicillin will control the infection in a high percentage of cases and greatly reduce the number requiring early surgery.[8] This series of five cases is not sufficiently large to permit the generalization that penicillin should replace surgical treatment.

It is evident that no therapeutic measure will ever replace tracheotomy for the patient with serious mechanical respiratory embarrassment. It must be clearly understood that adequate surgical decompression is demanded at the first indication of failure of the agent to control the infection.

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RÉSUMÉ

Dans cinq cas d'angine de Ludwig le traitement précoce par la pénicilline a évité l'intervention chirurgicale, qui est la thérapeutique habituelle de cette maladie. Il est manifeste que la trachéotomie ne peut être évitée lorsqu'il existe un obstacle mécanique à la respiration, mais il est probable que la pénicilline, administrée selon la technique mentionnée ici réduira considérablement le nombre des interventions chirurgicales dans l'angine de Ludwig. JEAN SAUCIER

STUDIES CONCERNING THE EFFECTS OF VARIOUS HORMONES UPON RENAL STRUCTURE

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IT is becoming increasingly more obvious that hormonal stimuli exert important effects upon the structure of the kidney. It has been known for some time that thyroxin causes renal enlargement in a variety of animal species[1-7] and more recently it has been demonstrated that various steroid hormones and anterior pituitary preparations likewise exert an important influence upon renal structure.

The effects of these hormone preparations may be roughly subdivided into two distinct types; the renotropic action and the nephrosclerotic action. The renotropic action is a purely stimulating one, mainly characterized by hyperplasia and hypertrophy of the tubular cells. The nephrosclerotic action on the other hand is definitely damaging to the kidney; it manifests itself by a more or less malignant type of nephrosclerosis, with hyalinization of the renal glomeruli and arterioles as well as the formation of hyaline casts which obstruct the tubular lumina. Experimental nephrosclerosis produced by hormones is usually accompanied by periarteritis nodosa in extrarenal blood vessels. Among the hormone preparations so far examined testosterone and many of its derivatives proved to possess a pure renotropic action[8-10] while desoxyeorticosterone acetate (D.C.A.) exhibits only nephrosclerotic properties.[11-14] Extracts prepared from the anterior lobe of cattle pituitaries are apparently endowed with both nephrosclerotic and renotropic potency and up to the present time it has not been possible to separate the crude preparations into purified fractions exhibiting the nephrosclerotic or the renotropic effect exclusively.[15-17]

The nephrosclerotic action of D.C.A. and of anterior lobe preparations is most obvious in unilaterally nephrectomized animals kept on a high sodium chloride intake. On the other hand neither unilateral nephrectomy nor a high sodium chloride intake appear to cause any significant increase in the kidney-stimulating potency of the renotropic steroids and anterior

lobe preparations. The selective sensitization of experimental animals to nephrosclerosis, by unilateral nephrectomy and high NaCl intake therefore proved to be a useful procedure for the detection of the nephrosclerotic property.

The experiments to be reported in this communication were performed to examine the effect upon the rat kidney of thyroxin, anterior lobe preparations, D.C.A., and methyl-testosterone, both singly and in various combinations. In most instances these hormones and hormone combinations were studied comparatively in intact animals kept on a normal NaCl intake and in unilaterally nephrectomized rats given abnormally high amounts of NaCl. It was hoped that systematic investigations of this type would reveal the optimum experimental conditions for the selective production of nephrosclerosis on the one hand, and of the renotropic effect on the other. The production of experimental nephrosclerosis is of special interest since it strikingly resembles the corresponding spontaneous disease of man, and elucidation of the pathogenetic mechanism responsible for the production of the former promised to throw some light upon the etiology and pathogenesis of the latter. Conversely, the renotropic effect interested us because we hoped stimulation of normal kidney growth might furnish us with important leads concerning the therapy of clinical conditions due to a destruction of renal tissue by disease.

EXPERIMENTAL

In the first series eight groups each consisting of 10 hooded castrate male rats ranging in weight from 90 to 110 gm. were unilaterally (left side) nephrectomized. In order to control the intake of NaCl, all groups were given 2 c.c. of 10% NaCl by gavage twice daily, and tap water *ad lib.* Group I acted as controls and was otherwise untreated; Group II received 200 γ of thyroxin as a finely ground suspension in 0.1 c.c. of distilled water; Group III received 0.4 c.c. of an anterior pituitary brei made by mixing 50 gm. of finely ground beef anterior pituitary tissue with 250 c.c. of physiological saline; in Group IV one pellet of D.C.A. compressed at a pressure of 1,000 lbs. per cm.^{2} and weighing about 45 mgm. was subcutaneously implanted into each animal; Group V received both thyroxin and anterior lobe brei in the same manner and dosage as Groups II and III; Group VI received both a D.C.A. pellet and the anterior lobe brei in the same manner and dosage as Groups III and IV; Group VII received both a D.C.A. pellet and thyroxin in the same manner and dosage as Groups II and IV and Group VIII received all three of these treatments (D.C.A., thyroxin and anterior lobe brei) simultaneously.

In this, as in the other series to be reported in this paper, all animals were fed exclusively on "Purina fox chow" and all surgical operations (including the implantation of pellets) were performed within the 24 hrs. preceding the initiation of injections. After 11 days of treatment the animals were killed, and their organs fixed in Suza mixture after which they were weighed and histologically examined.

In Table I as in all subsequent tables we listed the average initial and final body weight (the latter with its standard error) of the animals and the average absolute weight of the kidney and heart (with standard error). Since the weight of the kidney and heart is largely dependent upon the body weight, these two organ weights are also expressed as a percentage of

TABLE I.

ORGAN CHANGES IN CASTRATE MALE UNILATERALLY NEPHRECTOMIZED HOODED RATS MAINTAINED ON A HIGH NaCl INTAKE AND TREATED WITH VARIOUS HORMONES FOR A PERIOD OF 11 DAYS

Group	*Treatment*	*Body weight (initial) (gm.)*	*Body weight (final) (gm.)*	*Kidney weight ± standard error (gm.)*	*Kidney weight as % of body weight*	*% of incidence*		*Heart weight ± standard error (gm.)*	*Heart weight as % of body weight*	*% of cardiac lesions*	*Adrenal weight (gm.)*
						Nephrosclerosis	*Kidney pelvis œdema*				
I.	Controls	99	121±4	0.838±36	0.69	0	0	0.455±16	0.37	0	0.027
					% deviation from control				*% deviation from control*		*% deviation from control*
II.	Thyroxin	94	110±6	1.183±54	55	9	0	0.607±22	49	19	18
III.	Hyp. prep.	94	131±5	0.968±54	6	14	0	0.532±23	8	0	48
IV.	D.C.A.	94	108±6	1.064±18	42	13	80	0.504±22	24	13	37
V.	Thyroxin + Hyp. prep.	99	137±5	1.513±75	59	4	50	0.702±22	38	8	115
VI.	D.C.A. + Hyp. prep.	94	128±5	1.384±58	56	25	80	0.530±21	11	8	104
VII.	Thyroxin + D.C.A.	93	106±6	1.251±87	71	22	50	0.563±60	43	17	30
VIII.	Thyroxin + D.C.A. + Hyp. prep.	94	113±5	1.445±98	85	39	100	0.587±27	40	28	122

the total body weight. In the case of the normal control animals, the percentual kidney and heart weight respectively are expressed as such. In all experimental groups, however, the percentual deviation of the percentual weight from that of the controls is given. It was felt that it is more instructive to list the deviation rather than the absolute percentual weight since it is the change in weight (the deviation from the normal) that is of importance for the evaluation of our findings and not the weight itself. The absolute percentual kidney weight may, however, readily be calculated from the data of the table.

The histological changes in the kidney and heart are difficult to tabulate in a quantitative manner, but in order to furnish comparable average data the changes were expressed in a scale of + to +++ indicating increasingly pronounced degrees of inflammatory and degenerative lesions. In the columns headed "% incidence of nephrosclerosis" and "% of cardiac lesions" respectively, the intensity of these changes is expressed as a percentage of the theoretical maximum, which would be +++ in all cases. Thus, +++ lesions in all animals of the group are expressed as 100% while 33% indicates + in all animals or +++ in one-third of the animals, etc. A more detailed histological description of the changes is given below in the text. The absolute average adrenal weight is listed in the case of the controls while in all experimental groups the percentual deviation from this normal control weight is given.

In many of our animals marked œdema or actual inflammatory changes have been seen in the connective tissues surrounding the renal pelvis. These are difficult to estimate even in an approximate manner using a + to +++ scale. Without making serial sections through the entire pelvic region it would be extremely difficult to judge the extent of inflammation and œdema. Such serial sections have not been prepared, hence in our table changes in the renal pelvis (œdema or inflammation) are indicated by numbers referring to the percentual incidence irrespective of severity.

Perusal of Table I clearly indicates that all types of treatment (Groups II to VIII) caused an increase in kidney weight as compared to the controls (Group I). The absolute kidney weight was largest in Group V under the simultaneous influence of thyroxin and the hypophyseal preparation. But when the kidney weight is expressed as a percentage of the total body weight, simultaneous treatment with thyroxin, D.C.A., and the hypophyseal preparation (Group VIII) proved to cause the greatest increase in the renal weight, due to the fact that the body weight did not rise as markedly as that of the animals of Group V. It will also be noted that, in this eleven-day experiment, the renotropic action of thyroxin and of the hypophyseal preparation was merely additive in the case of combined administration of the two preparations (Group V). The nephrosclerotic effect of D.C.A. (Group IV) was somewhat increased by simultaneous treatment with the pituitary preparation (Group VI) or thyroxin (Group VII) and was most pronounced in the group receiving both thyroxin and the hypophyseal preparation in addition to D.C.A. (Group VIII).

Œdema or actual inflammatory lesions in the fat tissue surrounding the renal pelvis were seen in a significant percentage of the animals of all groups except the first three.

The heart weights approximately paralleled the kidney weights in the various groups, while the myocardial and endocardial lesions roughly paralleled the degree of nephrosclerosis.

It is rather interesting to note—though difficult to explain—that the adrenal weights were highest in Groups V, VI, and VIII, that is to say, in those animals which received the hypophyseal preparation in combination with thyroxin, D.C.A. or both of these compounds. This is all the more surprising since in intact (not partially nephrectomized) animals kept on a normal NaCl intake, D.C.A. causes compensatory atrophy of the adrenals. Even in this experiment D.C.A. caused no very significant adrenal enlargement when given by itself (Group IV) and the adrenotropic activity of the hypophyseal preparation in itself was likewise rather moderate, causing only a 48% rise above the control adrenal weight (Group III). The adrenotropic action of the anterior lobe preparation when given in combination with thyroxin (Group V) was greater than could be expected on the basis of a mere summation of the adrenal stimulating effect of these two hormone preparations given singly (Groups III and V). This potentiation of the adrenotropic effect of the anterior lobe preparation was also manifest in all other experimental series to be reported in this paper (see Tables II, III and IV).

TABLE II.

ORGAN CHANGES IN FEMALE UNILATERALLY NEPHRECTOMIZED ALBINO RATS, MAINTAINED ON A HIGH NaCl INTAKE AND TREATED WITH VARIOUS HORMONES FOR A PERIOD OF 20 DAYS

Group	Treatment	Body weight (initial) (gm.)	Body weight (final) (gm.)	Kidney weight ± standard error (gm.)	Kidney weight as % of body weight	% of incidence		Heart weight ± standard error (gm.)	Heart weight as % of body weight	% of cardiac lesions	Adrenal weight (gm.)
						Nephrosclerosis	Kidney pelvis œdema				
I.	Controls	121	159±6	1.030±37	0.65	0	0	0.568±25	0.35	0	0.044
					% deviation from control				% deviation from control		% deviation from control
II.	Thyroxin	121	164±6	1.310±49	23	0	0	0.756±29	31	3	36
III.	Hyp. prep.	121	224±7	1.540±43	6	0	90	0.854±23	9	17	89
IV.	D.C.A.	121	147±9	1.176±75	23	28	100	0.723±37	38	28	7
V.	Thyroxin + Hyp. prep.	120	193±11	2.485±178	97	42	100	1.095±58	60	33	184
VI.	D.C.A. + Hyp. prep.	121	202±13	1.983±148	51	46	100	0.941±53	31	52	93
VII.	Thyroxin + D.C.A.	121	153±8	1.739±102	74	61	100	0.863±50	60	66	46
VIII.	Thyroxin + D.C.A. + Hyp. prep.	120	192±8	2.628±150	110	68	100	1.098±52	63	69	207
IX.	Progesterone	112	153±6	1.110±41	11	0	0	0.563±22	3	0	−2
X.	Thyroxin + Progesterone	111	151±5	1.438±39	46	0	0	0.698±8	31	0	20

In the second series 110 female albino rats ranging in weight from 100 to 140 gm., were divided into 10 groups. Each group consisted of 10 animals but in Group VIII 20 animals were used because of the expected high mortality. All animals were unilaterally nephrectomized and, as in the first series, the NaCl intake was controlled by giving 3 c.c. of 10% NaCl twice daily by gavage; tap water was allowed *ad lib.*

Groups I to VIII received the same treatment, and in the same dosage, as the correspondingly numbered groups in the first series; Group IX received 5 mgm. of progesterone suspended in 0.1 c.c. of distilled water subcutaneously twice daily; Group X was given the same dose of progesterone as Group IX in combination with 200 γ of thyroxin. The animals were killed after 20 days of treatment; their organs were fixed in Suza, weighed and histologically examined.

It will be noted that the first eight groups of this second experimental series represent essentially a repetition of the first series, the only difference being that female albino rather than castrate male hooded rats, were used in order to establish whether female animals of a somewhat different strain would react essentially in the same manner. It will be recalled that male animals are unsuited for this type of experimentation because they are more resistant to nephrosclerosis; furthermore, having an important source of endogenous renotropic steroids in their testes, they do not lend themselves to the bioassay of this latter activity, therefore in all our relevant experiments either male castrate or female rats were used.

The last two groups (IX and X) were added in order to establish whether progesterone has any important renotropic or nephrosclerotic activity either when given alone or in combination with thyroxin.

Perusal of Table II indicates that in this somewhat more prolonged experiment, which lasted 3 weeks, the response to the different types of treatment was essentially the same—though more pronounced—as in the corresponding groups of the first series. In the present series combined treatment with thyroxin and the hypophyseal preparation (Group V) caused the second greatest, while treatment with thyroxin, D.C.A. and hypophyseal preparation (Group VIII) caused the greatest absolute and percentual increase in renal weight. It is remarkable that in the short period of 20 days the kidney weight was more than twice that of the controls in this group. The nephrosclerosis, however, was likewise highest in Group VIII so that the enlargement of kidney size was probably not accompanied by an improvement in renal function. On the other hand, in Group V under the combined influence of thyroxin and the hypophyseal preparation nephrosclerosis, though still very pronounced, was not as marked as in Group VIII. It will also be noted

that while thyroxin caused no nephrosclerosis (Group II), and D.C.A. alone (Group IV) caused only 28% of the possible maximum, the combined administration of thyroxin and D.C.A. (Group VII) resulted in a considerable increase to 61% in the nephrosclerotic activity of the latter compound.

In this 20-day experiment a high incidence of kidney pelvis œdema or inflammation was noted in all groups but the controls and the merely thyroxin treated animals (Groups I and II).

The heart weight tended to parallel the kidney weight in this as in the first experimental series and the cardiac lesions approximately paralleled the nephrosclerosis in the various groups.

As in the first series the largest adrenal weights were noted in the groups treated with the hypophyseal preparation in combination with thyroxin (Group V), D.C.A. (Group VI), or both of these preparations (Group VIII). The synergistic effect of D.C.A. alone (Group VI) was not particularly marked in the present series but thyroxin and thyroxin plus D.C.A. (Groups V and VIII respectively) proved to cause a much more pronounced adrenal enlargement than the hypophyseal preparation alone (Group III). It may be said that histological examination of these adrenals indicates that the enlargement is entirely due to cortical hyperæmia, hyperplasia and hypertrophy both in the first and in the second series. From these observations we may conclude that at least thyroxin and perhaps also D.C.A. exert a considerable synergistic effect upon the corticotropic activity of our hypophyseal preparation.

As regards progesterone given either by itself or in combination with thyroxin, our results clearly indicate that unlike in the chick[14] progesterone causes no nephrosclerosis in the rat, at least under the conditions under which it was tested in these experiments. Indeed, even the simultaneous administration of thyroxin—which so considerably enhances the nephrosclerotic action of D.C.A.—is ineffective in revealing any nephrosclerotic potency in the chemically so closely related progesterone.

Subsequently, two additional series of experiments (Series III and Series IV) were undertaken specifically in order to determine the optimum experimental conditions for the renotropic effect. Earlier experiments, mentioned in the introductory part of this paper, indicated that methyl-testosterone is one of the most active renotropic steroids. We therefore decided to substitute methyl-testosterone for D.C.A. in our last two experiments which were otherwise carried out essentially in the same manner as those of Series I and II.

In the third series, 96 castrate male albino rats, ranging in weight from 90 to 140 gm., were divided into 8 groups of 12 animals each. All rats were unilaterally nephrectomized and given 3 c.c. of 10% NaCl by gavage twice daily; tap water was allowed *ad lib.*

Groups II, III and V received the same treatment as the corresponding groups in series I and II; in Group IV each animal was implanted with one pellet of methyl-testosterone (Me-testo) weighing about 45 mgm.; Group VI received one pellet of Me-testo and 200 γ of thyroxin; Group VII received a similar Me-testo pellet and 0.4 c.c. of the anterior lobe preparation twice a day; Group VIII was given all three of these treatments simultaneously. The animals were sacrificed after 20 days of treatment and their organs were fixed in Suza weighed and histologically examined.

Sub-group 1 of each group in Table III represents the data obtained from 6 of the animals of each group in which food was withdrawn 16 hours before killing in order to determine the effect of fasting upon the organs influenced by the hormone treatment. Sub-group 2 summarizes the data obtained in the remaining fed animals. The final body weight in both these sub-groups was determined under equal conditions before food was withdrawn in sub-group 1.

It will be recalled that unilateral nephrectomy and administration of large amounts of NaCl considerably enhance the nephrosclerotic activity of hormone preparations, but do not exert any very pronounced sensitizing effect upon their renotropic action. It is for this reason that the final experiment was performed on intact rats receiving only tap water to drink. It was felt that under these conditions the renotropic or kidney-stimulating effect of the hormones and hormone combinations would probably manifest itself under optimum conditions so that increased production of healthy kidney tissue would result.

For this purpose in a fourth series, 96 castrate male albino rats ranging in weight from 90 to 140 gm., were divided into 8 groups of 12 animals and given tap water *ad lib.* All groups received the same hormone treatment as the correspondingly numbered groups in Series III, but unlike the latter they received no NaCl treatment and were not partially nephrec-

TABLE III.

ORGAN CHANGES IN CASTRATE MALE UNILATERALLY NEPHRECTOMIZED ALBINO RATS MAINTAINED ON A HIGH NaCl INTAKE AND TREATED WITH VARIOUS HORMONES FOR A PERIOD OF 20 DAYS

Group	Treatment		Body weight (initial) (gm.)	Body weight (final) (gm.)	Kidney weight ± standard error (gm.)	Kidney weight as % of body weight	% of incidence: Nephrosclerosis	% of incidence: Kidney pelvis œdema	Heart weight ± standard error (gm.)	Heart weight as % of body weight	% of cardiac lesions	Adrenal weight (gm.)
I.	Controls	1	114	157±7	1.126±62	0.71	0	0	0.612±27	0.39	0	0.041
		2		165	1.258	0.76			0.598	0.36		0.039
						% deviation from control				% deviation from control		% deviation from control
II.	Thyroxin	1	113	175±8	1.493±63	20	3	0	0.812±23	18	3	12
		2		170	1.636	26			0.798	31		49
III.	Hyp. prep.	1	111	212±7	1.868±124	24	12	10	0.957±42	15	4	122
		2		198	2.399	58			0.852	19		154
IV.	Me-Testo	1	111	196±8	1.392±64	0	0	0	0.681±33	−10	0	−27
		2		160	1.474	21			0.639	11		8
V.	Thyroxin + Hyp. prep.	1	112	209±11	2.814±227	88	12	30	1.061±69	30	43	175
		2		166	2.926	132			1.066	78		256
VI.	Thyroxin + Me-Testo	1	114	159±9	1.548±121	37	0	0	0.748±50	20	3	−7
		2		156	1.723	45			0.759	36		11
VII.	Hyp. prep. + Me-Testo	1	114	223±14	2.077±153	31	12	30	0.925±26	5	10	105
		2		229	2.927	67			1.029	25		143
VIII.	Thyroxin + Me-Testo + Hyp. prep.	1	114	201±14	2.747±139	91	67	20	0.978±38	23	40	263
		2		203	2.807	81			0.903	22		210

TABLE IV.

ORGAN CHANGES IN CASTRATE MALE NOT UNILATERALLY NEPHRECTOMIZED ALBINO RATS MAINTAINED ON A DIET CONTAINING A NORMAL AMOUNT OF NaCl AND TREATED WITH VARIOUS HORMONES FOR A PERIOD OF 20 DAYS

Group	Treatment		Body weight (initial) (gm.)	Body weight (final) (gm.)	Kidney weight ± standard error (gm.)	Kidney weight as % of body weight	% of incidence: Nephrosclerosis	% of incidence: Kidney pelvis œdema	Heart weight ± standard error (gm.)	Heart weight as % of body weight	% of cardiac lesions	Adrenal weight (gm.)
I.	Controls	1	111	176±10	1.468±85	0.83	0	0	0.612±32	0.34	0	0.035
		2		174	1.670	0.90			0.590	0.34		0.038
						% deviation from control				% deviation from control		% deviation from control
II.	Thyroxin	1	113	153±6	1.589±45	24	0	0	0.687±11	32	0	20
		2		183	2.115	28			0.826	32		16
III.	Hyp. prep.	1	113	227±9	2.164±126	14	0	0	0.879±64	15	0	126
		2		216	2.358	21			0.807	9		127
IV.	Me-Testo	1	111	178±6	1.654±26	12	0	0	0.658±5	9	0	−17
		2		166	1.836	22			0.585	3		−3
V.	Thyroxin + Hyp. prep.	1	113	214±4	2.656±115	49	0	10	0.995±45	35	8	280
		2		190	3.120	82			0.970	50		323
VI.	Thyroxin + Me-Testo	1	114	175±7	1.993±51	37	0	0	0.792±46	32	0	14
		2		185	2.287	37			0.738	15		−5
VII.	Hyp. prep. + Me-Testo	1	113	227±8	2.417±71	28	0	0	0.932±21	21	0	106
		2*		..	..	..			..	..	..	..
VIII.	Thyroxin + Me-Testo + Hyp. prep.	1	111	231±6	2.884±202	50	0	70	0.979±72	24	0	214
		2		230	3.554	71			1.010	29		192

*Owing to intercurrent disease all animals died in group 2.

tomized. The experiment ran simultaneously with Series III for twenty days, and the conditions under which the animals were sacrificed were also the same as in Series III. It will be noted that in Table IV which summarizes our pertinent data, the figures in the columns headed "Kidney Weight" refer to the combined weight of two kidneys.

The results of Tables III and IV may best be discussed conjointly. It appears that under the experimental conditions and at the dose level employed in these experiments methyl-testosterone in itself did not exert any significant renotropic effect. When given in conjunction with thyroxin, the renotropic effect of methyl-testosterone was apparently merely added to that of the former compound. On the other hand, the synergism between the renotropic action of thyroxin and the hypophyseal preparation appears to have been more than merely additive as judged by the results of both Series III and Series IV. In this instance, a true potentiation appears to have occurred, inasmuch as the percentual kidney weight increase in Group V of both experiments is greater than could be expected on the basis of mere summation of the increases noted in Groups II and III. It is of special interest to note in this connection, that this very powerful renotropic combination of hormones caused only traces of nephrosclerosis and renal pelvis œdema in a few animals in either of the two series. In agreement with expectations, nephrosclerosis and œdema or inflammation in the renal pelvis region occurred only in the groups in which the hypophyseal preparation was injected; they were more obvious in Series III (sensitization by unilateral nephrectomy and NaCl) than in Series IV. The fact that in Group VIII of Series III the incidence of nephrosclerosis was high, may be attributed to the fact that thyroxin sensitizes both to the nephrosclerotic and to the renotropic effect of the various hormone preparations. Even combined treatment with thyroxin, methyl-testosterone and the hypophyseal preparations (Group VIII) however, caused no nephrosclerosis in any of the intact animals of Series IV which received a normal NaCl intake.

The significance of the kidney pelvis changes is not fully understood as yet, but they appear to develop only in animals treated with compounds capable of eliciting nephrosclerosis, such as D.C.A. or the hypophyseal preparation. This effect is also reminiscent of the nephrosclerotic action in that it is more evident in unilaterally nephrectomized NaCl-treated than in intact animals, yet there is no very close quantitative relationship between the intensity of the renal pelvis lesions and the degree of nephrosclerosis in individual animals.

Comparison of the organ weights in subgroups 1 and 2 of the various groups in Series III and IV indicates that a fasting period of even only 16 hours suffices to reduce the weight of the enlarged kidneys and indeed this reduction tends to be greatest in the animals with the most marked renal enlargement. The heart and adrenal weights show no consistent change attributable to this short fast.

HISTOLOGICAL OBSERVATIONS

In the experimental part of this publication, we mentioned structural changes in the kidneys, heart and adrenals only from a quantitative point of view, that is, without entering into histological details. It is of some interest, however, to give a brief description of the microscopical changes observed. This may best be done conjointly for the various groups since the organ changes were essentially similar in many of the experiments.

As regards the kidney we distinguish two main types of action, namely, the renotropic and the nephrosclerotic. The renotropic effect, as we understand it, is a purely kidney-growth-stimulating action, such as is manifested in the present experimental series by methyl-testosterone and thyroxin. The hypophyseal preparation exerted a prevailingly renotropic action, but in high dosages and when administered to animals sensitized by unilateral nephrectomy and NaCl, this was sometimes accompanied by nephrosclerosis. Methyl-testosterone stimulates the tubular portion of the nephron exclusively,—as do most if not all the renotropic steroids—without causing any significant increase in glomerular size. On the other hand thyroxin, as well as the hypophyseal preparations, elicites a significant increase in the diameter of the glomeruli as well as a hyperplasia and hypertrophy of the tubules.

The most pronounced renotropic effect was seen in Group V of the four experimental series, that is to say, in the animals treated simultaneously with thyroxin and the hypophyseal

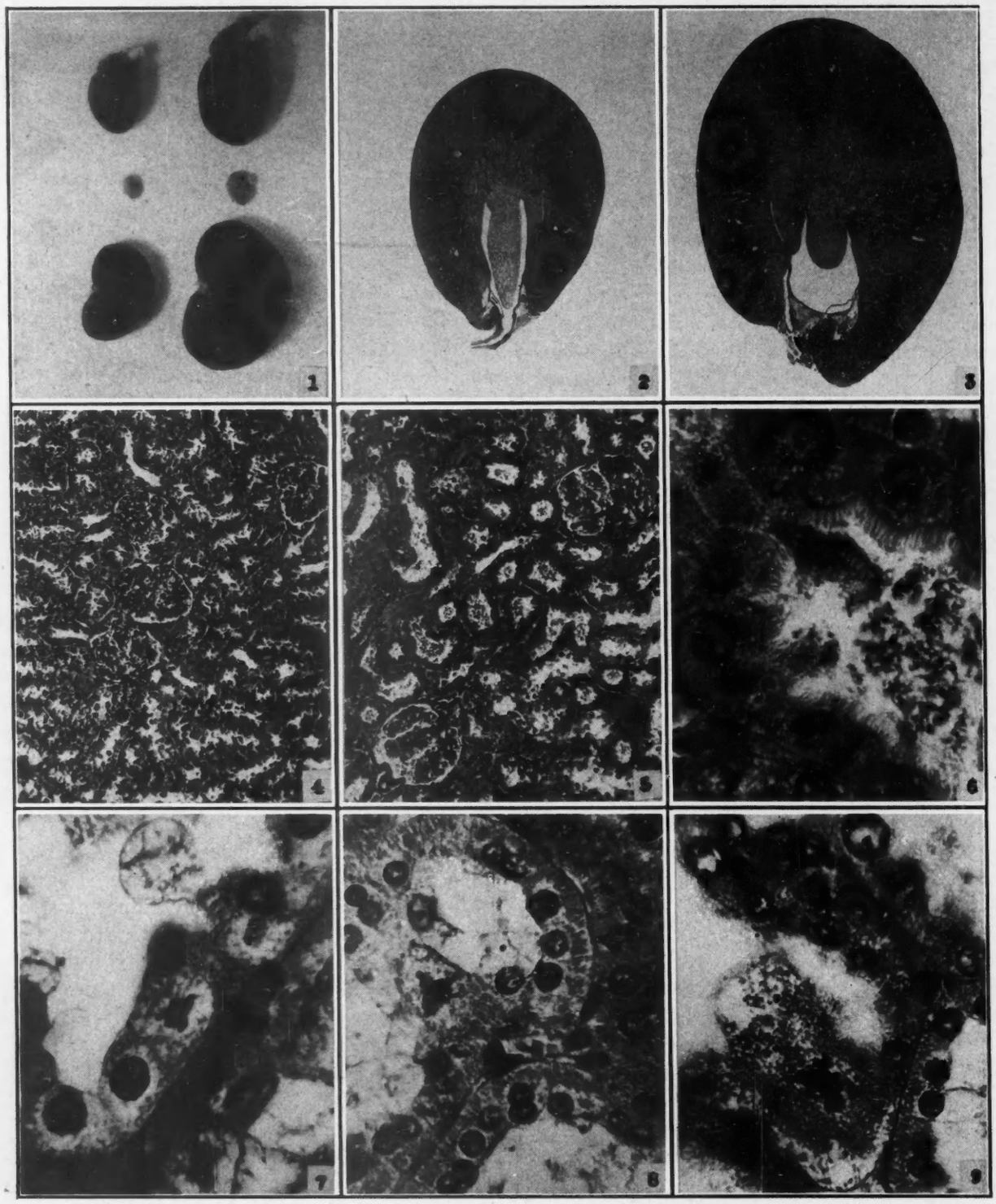
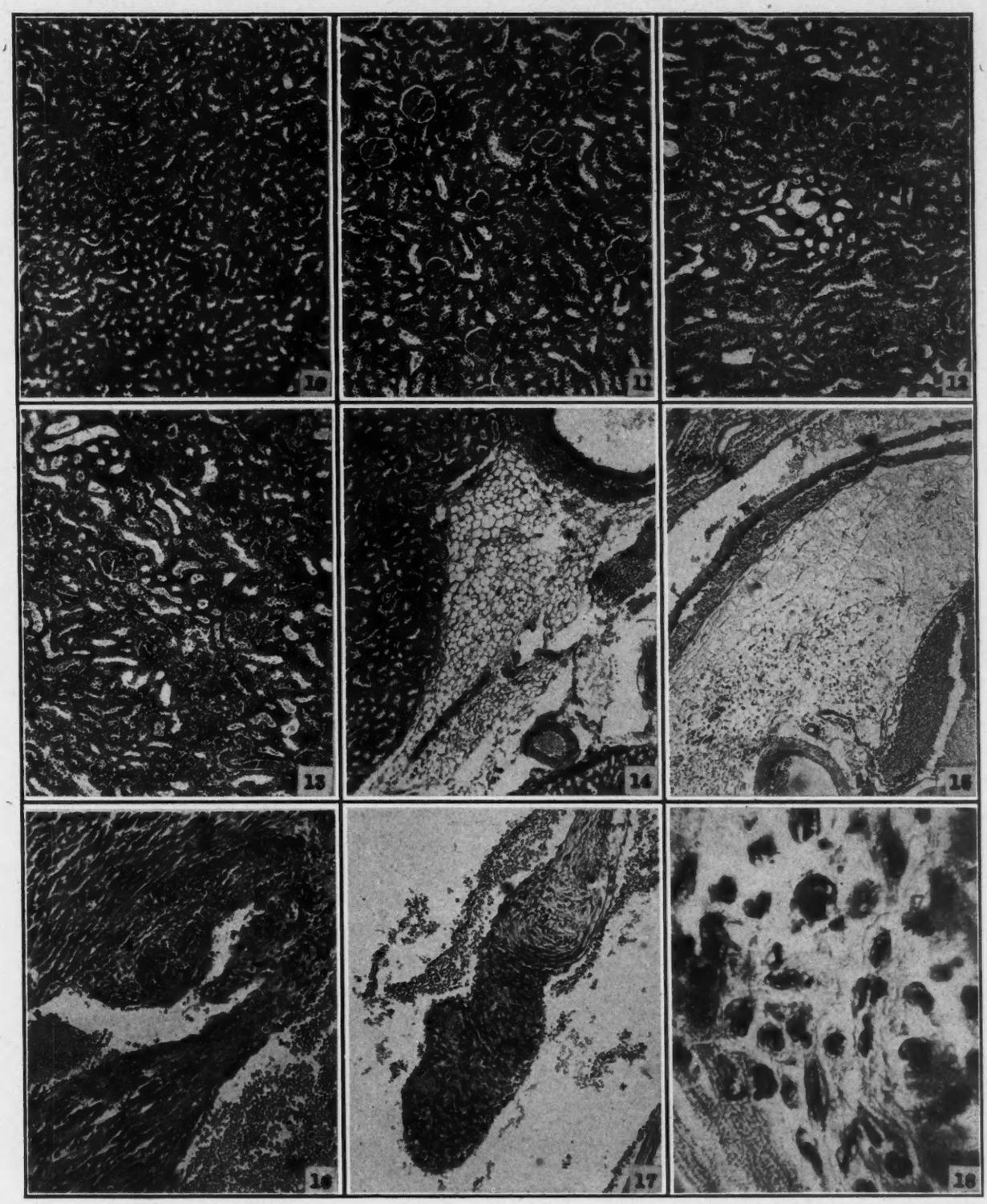


Fig. 1—Macroscopic aspect of heart, adrenal and kidney of a control (left) and an experimental (right) animal; the latter being treated with the hypophyseal preparation and thyroxin for a period of 20 days (from experimental Series II). **Figs. 2 and 3**—Low magnification of a cross-section through the kidney of a control (Fig. 2) and an experimental (Fig. 3) animal, the latter being treated with the hypophyseal preparation and thyroxin for a period of 20 days. Fig. 3 shows the enormous enlargement, especially of the cortical portions of the kidney, under the influence of the renotropic hormone combination (from experimental Series III). **Figs. 4 and 5.**—Medium magnification of the renal cortex of a control (Fig. 4) rat and a rat treated with the hypophyseal preparation and thyroxin for a period of 20 days (Fig. 5). In the latter note the hypertrophy and hyperplasia of the epithelial cells lining the tubules, regular and proportionate distension of all tubular lumina and enlargement of the renal glomeruli, but no signs of nephrosclerosis (from experimental Series II). **Figs. 6, 7, 8 and 9.**—Oil immersion view of various fields from the kidney of a rat having received the hypophyseal preparation and thyroxin for a period of 20 days (from experimental Series III). Note comparatively normal mitotic division in one cell and bud-like protrusion of the cytoplasm into the tubular lumen in another cell. This latter cytoplasmic change resembles apocrine secretion and is comparatively common in the kidneys of animals treated with anterior lobe preparations. Fig. 7 shows a cell in the process of mitotic division, about to be discharged into the tubular lumen. Fig. 8 illustrates a gigantic cell in mitosis apparently also ready to be shed off into the lumen. Note also several binucleated cells and great anisocytosis within this field. Compare, for instance, size of nuclei in the convoluted tubule at the lower right of the field with the giant nuclei on the upper border of the photograph in Fig. 9.



Figs. 10, 11, 12 and 13.—Various stages in the process of nephrosclerosis (experimental Series II). Fig. 10 shows the size of the convoluted tubules and glomeruli in the normal control kidney. Fig. 11 reveals the slight enlargement of tubules and glomeruli caused by thyroxin alone. Fig. 12 illustrates the very mild nephrosclerosis (dilatation of a few tubules with some intertubular sclerosis) elicited by the short treatment with D.C.A. alone and Fig. 13 the more advanced nephrosclerosis (tubular casts, many dilated tubules, some glomerular sclerosis) elicited by simultaneous treatment with thyroxin and D.C.A. **Figs. 14 and 15**—Normal connective and fat tissue in the renal pelvis of a control animal (Fig. 14) and œdematous connective tissue with round cell infiltration in that of a rat treated with hypophyseal preparation, thyroxin and D.C.A. (Fig. 15) (from experimental Series II). **Figs. 16, 17 and 18.**—Various stages of the endo- and myocarditis seen in rats treated with the anterior pituitary preparation, thyroxin and D.C.A. (from experimental Series II). Fig. 16 shows endocardial vegetation between capillary muscles. There is some proliferating, giant cell containing granulomatous tissue near the base of the vegetation where it is attached to the endocardium while the lumenward directed free surface (lower part of picture) consists entirely of a hyalinized homogeneous mass. Fig. 17 illustrates a granulomatous excrescence on the free edge of the mitral valve. Fig. 18 shows a multitude of the typical "Antischkow myocytes" or "caterpillar cells". Note the caterpillar-like arrangement of the chromatin in the elongated nuclei.

preparations. In these groups as well as in Group VIII of Series III and IV—in which in addition to thyroxin and hypophyseal preparations, methyl-testosterone was given—the tubular epithelia and the glomeruli were not only enlarged but there were also signs of excessive mitotic proliferation in the various parts of the convoluted tubules. These mitoses were frequently atypical and in many cases appear to have ended in the death of the cells. Many of the tubular epithelial cells in which mitoses were seen, were gigantically enlarged and contained chromosomes and spindles of unusual size. Some of the dividing cells were observed to be discharged into the tubular lumina. There was also a considerable degree of anisocytosis and numerous binuclear or even polynuclear epithelial cells were seen among the normal lining cells of the tubules (see Figs. 1 to 9).

All these phenomena are probably an indication of an excessive proliferative activity, which takes place under the influence of overdosage with potent renotropic hormones and hormone combinations. It is probable that such exaggerated proliferative activity is detrimental to the function of the renal tubules, since it is unlikely that the cells engaged in mitosis or the newly-formed polynuclear cells could be normally effective in the performance of their physiological functions. Experiments are now under way, in which the same hormones and hormone combinations are given at a much lower dose level but for a longer period, with the view of obtaining a more gradual and normal increase in renal mass.

Even the most actively growing kidneys, which contained many atypical mitoses, showed no indications of actual tumorous growths. Yet, the atypical proliferation of the epithelial components raises the question whether, under suitable circumstances, renotropic hormones could not induce experimental kidney tumours in the same manner as folliculoid preparations can cause neoplastic proliferations in the organs whose growth they normally stimulate. Here, again, further experiments are necessary to settle the question.

The changes in the renal pelvis were of special interest to us since we apparently missed them in our earlier work concerned with the effect of hormones upon the kidney. Generally speaking, they were most pronounced in those animals in which nephrosclerotic hormones or hormone combinations were given; hence, it is probable that the pelvic changes are associated with the nephrosclerotic, rather than with the renotropic activity of theses preparations. In the absence of any definite information regarding this point, we will discuss the renal pelvis lesions apart from both the renotropic and the nephrosclerotic changes.

Apparently the first stage in the development of these renal pelvis lesions is the formation of an œdema in the adipose tissue surrounding the kidney hilum (see Figs. 14 and 15). The cells of this region lose much of their fat content and are transformed into a more or less irregular, almost myxomatous tissue. Between the cells large accumulations of fluid appear which are readily detectable under the microscope, but visible, in the form of a gelatinous mass, even by mere naked eye inspection. In somewhat more advanced cases granuloma cells appear within the œdematous region. They consist of young fibroblasts, lymphocytes, polymorphonuclear leucocytes (often of the eosinophilic and pseudo-eosinophilic type) as well as mast cells. Only in a few instances did this œdematous granuloma tissue take on a definitely purulent character. In such advanced cases the transitional epithelium of the renal pelvis was often also infiltrated by the inflammatory exudate so that a pyelonephritis resulted. As stated before, the administration of NaCl, as well as the removal of one kidney, sensitizes the experimental animals to the development of pyelonephritis, just as it sensitizes to the nephrosclerotic effect. Without going too far afield in our interpretation of this phenomenon, it is perhaps permissible to raise the question whether some of the so-called "cryptogenic types" of pyelonephritis, seen in clinical medicine, could not be caused by a hormonal imbalance.

The characteristics of experimental nephrosclerosis produced by D.C.A. have been extensively reviewed in our previous publications so that we need not discuss them here in detail. Suffice it to say that, during the early stages, hyalin casts appear within the tubular lumina and the resulting occlusion of the latter causes dilatation of the nephron segments proximal to these casts (see Figs. 10 to 13). In later stages there is round cell infiltration and sclerosis of the stroma between the dilated tubules and eventually hyalinzation of the glomerular capillaries with the formation of a hyalin transudate

in the capsular space. The small renal arterioles, and especially the efferent arterioles of the glomeruli, participate in this process inasmuch as they show hyalin necrosis of the vascular walls and later infiltration by round cells.

Even the large renal arteries in the hilum region are affected inasmuch as the nuclei of the muscular coats undergo degenerative changes and the nuclear chromatin assumes a granular, pyknotic appearance. It is our impression that these changes in the renal blood vessels merely represent a special manifestation of the periarteritis nodosa, so frequently produced by nephrosclerotic compounds in other vascular territories, especially in the mesentery. In those animals of the present experimental series, in which the renal changes were particularly pronounced, periarteritis nodosa was occasionally also seen in other blood vessels; this led to infarcts in the heart and the brain. The changes in the brain were generally limited to the cortical layer and assumed the appearance of an acute apoplexy with necrosis of brain tissue. Animals so affected almost invariably showed clinical manifestations of nervous disturbances such as convulsions, paralysis, etc.

Perusal of the tables reveals that the weight of the heart roughly parallels that of the kidney. It is very probable that this enlargement of the heart is merely a repercussion of the hypertension occasioned by the renal changes. Histologically, the cardiac muscle fibres appear hypertrophic, but degenerative changes were absent, or at least of moderate degree, in those animals in which the kidney showed no sign of sclerosis. Conversely, in the animals in which nephrosclerosis was produced (regardless of the eliciting agent) the cardiac vessels almost invariably showed some sign of periarteritis nodosa.

In addition to this, degenerative and inflammatory lesions were also found among the cardiac muscle fibres and in the stroma of the heart. These latter lesions are rather reminiscent of rheumatic carditis and have repeatedly been described in our earlier experiments on D.C.A. over-dosage; hence, we need not describe them in great detail here. Briefly they may be summarized by saying that within the myocardium small nodules appear, in the centre of which there is generally some hyalinized or necrotic tissue surrounded by a granulomatous zone in which mitotic proliferation, "myocardial histiocytes" (Anitschkow's myocytes or "caterpillar cells") and rather atypical giant cells (not unlike the Aschoff cells) are plentiful. Such granulomatous vegetations are also seen attached to the endocardium of the atria, auricles, ventricles and sometimes on the cardiac valves, especially the mitral valves (see Figs. 16 to 18). It is undeniable that these endocardial and myocardial lesions are very reminiscent of rheumatic carditis and endocarditis, but the relationship of this experimental condition to the acute rheumatic fever of man has not been clarified as yet.

In connection with the present experiments, the important fact is that the degenerative lesions in the heart appeared most frequently and with the greatest intensity in the animals receiving D.C.A. in combination with thyroxin, or other hormone combinations conducive to severe nephrosclerosis.

The adrenal lesions do not require a detailed histological analysis. Suffice it to say that the enlargement of the suprarenal glands was due entirely, or at least prevailingly, to a hypertrophy and hyperplasia of the cortical portion of the gland. There was also marked hyperæmia of the cortex sometimes accompanied by periarteritis nodosa and hæmorrhages into the cortical tissue.

SUMMARY

In continuation of our work on the etiology and therapy of malignant nephrosclerosis, experiments were performed under diverse conditions in order to examine the effect of various hormones and hormone combinations upon the kidney, the heart and the adrenals of the rat. The principal results of these investigations were the following:

A saline suspension of cattle anterior pituitary tissue causes pronounced hypertrophy and hyperplasia of the renal tubule cells as well as some increase in the diameter of the glomeruli. This renotropic effect is greatly enhanced by the simultaneous administration of thyroxin although the latter hormone possesses only moderate kidney-stimulating properties when given alone. It is noteworthy that the weight of the heart and adrenals is likewise considerably increased under the influence of this combined treatment with thyroxin and the hypophyseal preparations; the increase being of such magnitude that we may well speak of potentiation rather than of mere summation.

The nephrosclerotic potency of D.C.A. is also enhanced by simultaneous thyroxin administra-

tion. Animals treated with D.C.A. developed nephrosclerosis, œdema or inflammatory changes in the fat tissue surrounding the renal pelvis, degenerative and inflammatory changes in the heart muscle and endocardium (these resemble the lesions characteristic of rheumatic carditis) as well as vascular lesions of the periarteritis nodosa type. All these overdosage effects of D.C.A. are considerably enhanced by simultaneous treatment with thyroxin. Combined administration of D.C.A. and the hypophyseal preparations likewise resulted in over-dosage symptoms, similar to those described above.

In confirmation of our previous experiments, we found that methyl-testosterone exhibits a renotropic action, inasmuch as it induces hypertrophy and hyperplasia of the renal tubules. It does not noticeably increase the diameter of the glomeruli. Unlike the renotropic anterior lobe preparation, the renotropic action of methyl-testosterone is not potentiated by simultaneous administration of thyroxin, but the kidney-stimulating effects of the two hormones are apparently merely summated.

Combined administration of methyl-testosterone and the hypophyseal preparation, likewise resulted only in a summation and not in true potentiation of their renotropic effect.

Removal of one kidney and the administration of NaCl in high doses greatly sensitizes the rat to the nephrosclerotic effect of various hormones and hormone combinations. Such sensitization also increases the incidence of cardiac lesions, periarteritis nodosa and œdema of the renal pelvis. On the other hand, the true renotropic (kidney growth-stimulating) effect of various hormones and hormone combinations was not significantly augmented by unilateral nephrectomy and a high NaCl diet; it appears as though after unilateral nephrectomy the growth stimulating effect of the hormone treatment were merely concentrated on the remaining kidney instead of being equally distributed between the two organs.

Under the influence of very potent renotropic hormone combinations (*e.g.*, hypophyseal preparation plus thyroxin) innumerable mitotic divisions (some atypical) were noticed in the lining cells of the renal tubules.

The adrenotropic effect of the anterior lobe extract was enormously enhanced by simultaneous treatment with thyroxin.

The expenses of these investigations were defrayed through a grant received from the DesBergers-Bismol Foundation. The authors are greatly indebted to Dr. Schwenk of the Schering Corporation of Bloomfield, New Jersey, for supplying generous amounts of desoxycorticosterone acetate and to Dr. Hans Jensen of the DesBergers-Bismol Laboratories for furnishing the large quantities of beef anterior lobe tissue which we required for this work.

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THE PRESENT STATUS OF THE INTERNAL FIXATION OF FRACTURES*

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WITHOUT benefit of historical record, there is little doubt that the first major surgery attempted by our most primitive ancestor was the setting of a fracture. He was content with the closed method, as were his increasingly learned progeny, for some thousands of years.

When M. Lapeyoden, in 1795, emboldened by operative success in other fields, began wiring broken bones, his septic disasters discouraged emulation. But with the coming of Lister and his new era, as one after another of the body fastnesses became surgical hunting grounds, the first open reduction phase in fracture therapy grew to a rapid maturity under the brilliant, driving efforts of its protagonist, Arbuthnot Lane.

Lane was a surgical architect. He saw the skeleton as a bony framework that must

* Written from a talk given for the Dalhousie Refresher Course, 1942-43.

always be maintained in perfect alignment and balance. From a poorly reduced fracture of the ankle he could prognosticate the most gloomy sequelæ of static foot deformities; scoliosis and lordosis, sacro-iliac arthritis, disability, and distress.

The accurate, open reduction with internal fixation was the prophylactic to all this. Lane, ingenious and able craftsman, supported with equal brilliance in America by John B. Murphy, developed a new field of fracture therapy, with a new surgical armoury of wire, bone plates, nails and screws.

The followers of Lane and Murphy, with a lesser enthusiasm, and often a less gifted technique, soon had reason to question the universality of the new methods. Necrosis about the wires and screws, non-union, osteomyelitis—these persistent spectres would not stay buried. Besides, new techniques of closed reduction were becoming more accurate.

Roentgenologists were approximating direct inspection of the fracture by taking x-rays in two or more planes. A new field of fracture mechanics was growing. Cotton and Loder showed how lines of force acted to produce the Colles' fracture; and how reversal of the forces could bring about a perfect reduction. The complex maze of ankle and lower leg fractures became orderly, understandable, under the same application of the laws of cause and effect.

Plaster of paris came into general use, making for more accurate splinting. Improved methods of traction, particularly the Kirschner wire, simplified closed techniques. Finally, through the work of Delbet, Böhler and Gurd, a new means was found for combating the soft tissue complications of fractures — the stiff, thickened joint structures, tenosynovitis, the atrophied muscles. The functional splint, either as the unpadded walking cast, the arm cast giving free movement to the fingers, or the walking body jacket, made possible the maintenance of soft tissue tone through the weeks of bone immobilization, and replaced massage by active motion.

Closed reduction attained such proficiency that some fracture surgeons of the nineteen-twenties came to look upon open operation as a sign of weakness, a confession of failure.

In recent years has come a gradual swing back again to open reduction with internal fixation. What lies behind this? The reasons are four.

1. *The general surgical advance in all fields.*—During the last twenty-five years a myriad of little contributions from surgeons, from laboratory workers, nurses, surgical manufacturers, have made the operating theatre and the post-operative ward a safer place for the patient.

2. *A growing knowledge of muscle physiology.*—Why physiologists, who bury themselves in arduous endocrine or sympathetic exploration, find so little to interest them in the musculature, is difficult to understand. The simple concept of each muscle as an independent bundle of contractile cells may be adequate mechanically; but it is not, surgically. Stimulated by the advent of the Kenny treatment of poliomyelitis, and its aftermath of discussion and experiment, a more profound muscle physiology is growing. Most often it is a clinical physiology; sometimes it blooms in the research laboratory. It may still be riddled with inaccuracies but it has surgical merit.

These are its tenets:

(*a*) An immobilized muscle undergoes atrophy, and eventual fibrosis.

(*b*) Its motor nerve supply degenerates if the muscle be immobilized too long.

(*c*) Muscles overstretched by the mechanics of a fracture reduction and, probably, muscles allowed to contract beyond the normal, degenerate more rapidly.

(*d*) One injured muscle may impair the muscular co-ordination of a part. This, if unrecognized and untreated, may lead to permanent disability in a fractured limb that skeletally has been reduced to normal.

(*e*) An immobilized joint becomes atrophic, losing most of its synovial fluid. This may well be the first stage of the so-called "post-traumatic arthritis".

(*f*) An active, well-nourished muscle is a very important factor in the union of the fractured bone it embraces. The old clinical idea that friction between fractured bone ends stimulated callus is, of course, wrong. A slow-healing fracture will sometimes throw out fresh callus after the removal of its splint. But the reason lies not in the chafing bone ends. It is the released muscles, blood-rich in their new activity, that bear fresh, callus-stimulating nutriment to the bone. Rigidity of bone and activity of muscle are nature's way, and the more closely surgery

Fig. 1. (Olecranon fracture).—One 2½" screw gives solid fixation of a fractured olecranon process. Distally the screw should catch the ulnar cortex. Its thread should not be too fine or it will strip its bed. The only external retention in this case was a sling, removed at intervals after the first week for guarded, active movements. Union was firm and elbow function complete at three weeks. **Fig. 2.** (External rotation fracture of tibia and fibula).—This 3rd degree external rotation fracture of the tibia and fibula was reduced operatively, and plated. Twelve months after the accident, and six months after the last support was removed, the patient fell, opening up the old fracture line. The vitallium screws, while jarred, held. The plate twisted, but prevented gross displacement and the second fracture was put up without further reduction, again uniting with apparent firmness in six months. The proximal screw in the four screw plate should be noted. Broken while being inserted, it could not be removed. Since that time we have preferred six-hole plates. **Fig. 3.** (Fractured femur).—Because of a severe head injury no reduction was attempted in this case till 16 days after the accident. Open reduction was first choice. Two cross screws, from cortex to cortex, in the horizontal oblique, and one in the vertical oblique, supported the plate to give absolute rigidity. The leg was laid in a Thomas splint permitting active movements of the ankle and hip, and passive movements of the knee. X-ray, 32 days after reduction shows good callus. We prefer the Sherman type of plate used here to the Lane or Venable, because it is stronger. This is a six-hole plate, the distal hole unused because of its proximity to the knee joint. **Fig. 4.** (Fracture of the surgical neck of the humerus).—Manipulation and traction failed to reduce this fracture of the surgical neck of the humerus in which the distal fragment had torn through the deltoid. Fixation was rigid with two screws, one obliquely into the head, the other transversely from cortex to cortex. External fixation was with a sling only, and supervised active movements of the shoulder were permitted after twelve days.

follows nature, the more nearly does it attain to perfection.

(*g*) Muscle resistance to infection is low. From this it follows that not only must damaged muscle be excised in treating a compound fracture; but that muscle should be dealt with gently in the process of internal fixation, and any traumatized portion excised before the incision is closed.

In the Cotton-Loder reduction of a Colles' fracture I have more than once demonstrated, to the patient's discomfort and my own distress, the ill effects of overstretching the muscles, tendons and ligaments of and about the wrist joint. Particularly in the elderly patient an imperfect reduction may give a better end result than one in which bony perfection has been won at the cost of lasting damage to the soft tissues.

Similar observations may be made in external rotation fractures of the tibial shaft. Swollen, dusky, tingling toes are not uncommon after the active manipulations and forced internal rotation of the foot necessary for the reduction of those badly displaced. Similar fractures, treated by open reduction with internal fixation, and unpadded plaster, show almost no soft tissue reaction distal to the fracture site.

Thus, while muscle therapy, as an integral part of fracture therapy, was first put on a sound clinical basis by the advent of functional splints, there are still fractures where closed reduction gives a good skeletal result but functionally leaves deformity. The fracture surgeon will do well to remember, as he first seeks bony apposition, that weeks or months hence he will complete his labours on an in-

jured muscle. Bone therapy always ends with muscle therapy.

3. *Chemotherapy.**—The operative wound offers an excellent receptacle for the sulfonamides. Sulfanilamide shows an effective blood concentration within approximately five hours of its application. This reaches a maximum at twelve hours, which is maintained to twenty-four hours. The curve then falls to zero at the sixtieth hour. Sulfathiazole, being more slowly absorbed, reaches its effective concentration after the sulfanilamide has been excreted, and maintains it longer. The least irritating of the group to the tissues, sulfathiazole is also germicidal to the greatest variety of organisms. Sulfadiazine, most slowly absorbed, is also the most irritating.

Our choice, therefore, has been a combination of sulfanilamide and sulfathiazole, the amount being based on the working rule that 1 gram in the tissues will yield a blood concentration of approximately 1 milligram per 100 c.c. Thus, 4 grams of each drug in the wound are considered necessary for a minimum, adequate therapeutic blood concentration. A more level blood concentration, after the second day, may be attained by the use of a greater proportion of sulfathiazole.

Despite intensive research there is still doubt as to the topical effect of the sulfonamides. Are they absorbed from

* It is interesting to remember that while Ehrlich was seeking his ideal antiseptic, a dye that would stain and kill germs without harming the tissues of the host (a search that yielded him salvarsan), an obscure German chemist in the cotton industry was labouring over another red dyestuff. Patented and forgotten on a laboratory shelf for 30 years, this was rediscovered as sulfanilamide.

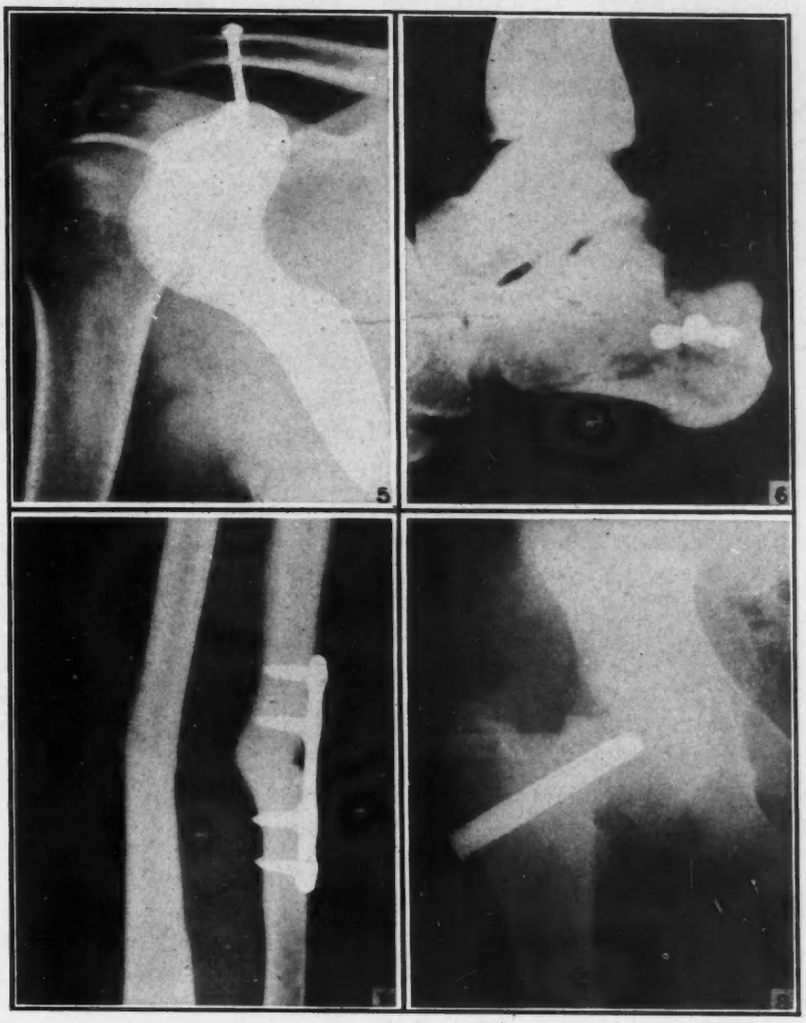

Fig. 5. (Dislocation of the outer end of the clavicle).—This dislocation could not be held in reduction by strapping. The single screw into the coracoid process gives better fixation than wiring the joint. Since the relations between clavicle and coracoid process are not normally fixed, there is discomfort on active movements of the shoulder till the screw is removed. In the clavicle, ½″ distal to the screw may be seen a drill hole where a first screw was placed too far laterally. **Fig. 6.** (Fracture of the os calcis).—This was a severe compound injury, a complete section being torn out of the tendo Achilles and the os calcis being shattered into five widely separated fragments. These were moulded into place and all five transfixed with two vitallium screws. The tendo Achilles was sutured with silk, the wound closed and the leg wrapped in plaster. Union was rapid and weight bearing, in a padded leather shoe, was permitted after five weeks. **Fig. 7.** (Fracture of the radius and ulna).—A bone plate was used with osteo-periosteal grafts in this case of non-union of the radius, one year after the fracture. Union was slow till the unpadded cast was removed some months later, and a sling substituted. On being told to squeeze something, such as a rubber ball, in his hand for exercise, the patient decided a cow's udder to be more practical, and went back to his dairy work. Muscular regeneration of the arm and good bony union followed promptly and simultaneously. **Fig. 8.** (Fracture of the neck of the femur).—A Smith-Petersen nail was used to support the fracture line in conjunction with a ½″ square cortical graft in this ununited intertrochanteric fracture. Two weeks postoperatively, we put on a light plaster spica for 10 weeks. This was then removed; union appeared to be good and after a month of physiotherapy, protected weight-bearing was permitted. Because of the coxa vara which, preoperatively, did not respond sufficiently to traction or abduction, the patient wears a ½″ lift on his heel and walks with a slight limp. Shortening could be corrected by an intertrochanteric osteotomy.

the wound by the lymphatics and capillaries, to return in all their germicidal might by the arterioles? If this be so, then a good blood concentration should be maintained. Or do they act directly in the wound? Clinical observation strongly supports this hypothesis; and if so, much smaller quantities may be used, a high blood concentration being unnecessary.

The problems of sensitivity and hypersensitivity to the drugs grow more acute with each new case of poisoning reported. And the powder once buried in the wound may not be recalled. Still it seems to us that the advantages of this method of administration outweigh its potential dangers.

In civilian practice, penicillin is still too precious to be used as a prophylactic. Its less illustrious cousin, gramicidin, in the form of tyrothricin, has too short a life in the tissues to be used in this way, but we have found it dramatically effective in the staphylococcal-infected wound.

4. *Fixation agents.*—Vitallium, best known, and probably best liked, by the tissues, of the new internal fixation agents, is familiar to all surgeons. Setting up no absorption or inflammation of tissue, this cobalt-chromium-molybdenum-nickel alloy is silent within the body.

It has stimulated internal fixation techniques because: it does not jeopardize bony union; enough may be introduced to fix rigidly the fracture without added tissue strain. In many fractures this makes for light external splinting, or none, thus permitting better maintenance of soft tissue tone. It can be used in compound fractures without added risk of osteomyelitis or sinus formation; a screw, properly placed, will hold tight indefinitely. This obviates the need for wire, always unsound mechanically, and for the band, which was physiologically unsound as well; it can be used in conjunction with bone grafts without endangering the vitality of the transplant.

So it is with good reason that the fracture surgeon is returning to the ways of Lane and Murphy. Surgically they are now safer ways, technically they are truer. The indications for them fall into four groups:

1. Open reduction and internal fixation have remained through the years the method of choice in dealing with fractures of the olecranon process and the patella.* To these have been added, through the work of Smith-Petersen and others, fractures of the femoral neck.

We should like to add to this small list the third degree external rotation fracture of the tibia and fibula (*i.e.*, the spiral fracture of the tibia's lower third). The reduction of this fracture by manipulation is always difficult. Of necessity it puts a heavy strain on the ligaments and tendons about the ankle joint. An imperfect reduction tends further to delay the already tardy regeneration for which fractures at the lower and middle tibial thirds are notorious. There have been sad occasions when these fractures, well reduced, have slipped within the unpadded cast, a fact often undiscovered till callus is laid down.

On the other hand, the open reduction, done immediately after the fracture, is direct and simple. Application of the plate on the subcutaneous surface of the tibia should take no more than a few minutes. The walking cast may be applied on the operating table, or ten days later. Good alignment is assured and union, in most cases, hastened.

2. Many of the classical fractures of the body, normally amenable to closed reduction will, at times, because of extraordinary complications, become operative cases. The thinking surgeon will study his case before attempting any form of reduction. He will remember that an open reduction gives best results when done early. He will have ample justification for making open reduction second choice, having failed with manipulation. But if he uses it only as a "last ditch therapy" he will grow pale in the shadow of his failures.

3. In compound fractures, particularly if gotten within twelve hours, we do not hesitate to use as much vitallium as is necessary to stabilize the fracture. If infection does develop, it can be met a little more readily if the fracture is well fixed from within.

4. In cases of non-union (almost always the result of insufficient and inadequate immobil-

* I should like to interject here a protest against the excision of the fractured patella. Serving as a lever for the quadriceps muscles, and as a bumper for the most often traumatized joint in the body, its removal, except when hopelessly fragmented in capsule and body, is both unnecessary and physiologically unsound. Because of the nature of the bone I have not been successful in attempts to screw the fragments together, and depend on suture of the capsule, with or without kangaroo tendon ties through the fragments.

ization, with or without poor apposition) soft tissue therapy is most important. These cases have usually had long periods of immobilization. Muscles, ligaments and joints are stiff, atrophic. In treatment, bone union is the prime requisite, but early, active movement is also essential.

To combine these two is difficult. It can be done if the fracture line be grafted, and rigidly supported as well. Where the full cortical graft is necessary it may be difficult to plate the bone ends simultaneously. We often find, in the history of non-union cases, evidence of inadequate immobilization following the fracture. We assume this to be the cause of the non-union, no general, predisposing factors being discernible. Here, freshening and drilling of the bone ends, followed by bone plating and light osteo-periosteal grafts will frequently give more rapid union than the unsupported cortical graft, and a better functional and economic outlook for the patient. The earlier use of the part permitted by the supporting plate (particularly in the upper extremity) makes for better soft tissue tone, earlier disappearance of bone atrophy and bone union concurrent with muscle recovery.

For all her antiquity, like Maeterlinck's ideal woman, surgery bears an ever youthful, ever changing form. Therein lies a great part of the charm with which she binds her acolytes. In fracture therapy, now is a good time for these acolytes to pause, to ponder, to admire, and not to grow bewitched. Let us not be dazzled to excesses by the beauty of her new raiment, nor yet turn the blind eyes of prejudice against it. The acolyte who serves with mind as well as heart, serves best.

SUMMARY

The history of the open reduction and internal fixation of fractures is reviewed. The present trend toward internal fixation is attributed to: general surgical advances; a new muscle physiology; modern antiseptics; new fixation agents. The influence of the present trend is discussed in connection with: fractures in which open reduction is first choice (3rd degree external rotation fractures of tibia and fibula being included in this group); fractures where open reduction is ordinarily second choice; compound fractures; grafting in non-union. A warning is sounded against over-enthusiasm for the new methods.

28 Carleton Street.

TRANSPLANTATION OF THE PERITONEUM IN TREATMENT OF DIRECT INGUINAL HERNIÆ

By Major Arthur M. Vineberg, R.C.A.M.C.

Montreal Military Hospital

THE operative treatment of the direct hernia has, for many years, been the subject of considerable controversy. The literature contains many articles concerning this subject. The surgical treatment of a direct inguinal hernia involves two separate and distinct procedures, namely, the repair of the inguinal canal, and closure of the peritoneal sac. It is with the latter that we are, primarily, interested. The operative procedure about to be described is dependent upon a new and different manner of handling of the peritoneal sac. Designed, primarily, for the closure of direct inguinal hernial sacs, it has also been used successfully in the treatment of large, indirect and recurrent herniæ. We are of the opinion that it should not be used in children or young adults where the peritoneal sac is narrow. The method of high ligation of the sac in the aforementioned type of case has proved so successful that we feel it should not be discontinued.

INCIDENCE OF RECURRENCE

The incidence of recurrence reported by different authors varies considerably; some of the earlier authors, for example, Gallie, Lemesurier[1] in 1934, reported an incidence of 40 to 50%. Burdich[2] in 1937 gave figures of 25.8%. Fallis in the same year[3] reported a primary recurrence rate of 8.25% and a secondary recurrence rate, in 200 cases, of 13%. Shelley in 1940,[4] in a study of 565 direct herniæ, showed that with transplantation of the cord and the use of fascial sutures taken from the external oblique aponeurosis to approximate the conjoined tendon to the internal oblique muscle, there was a 10.4% recurrence, whereas in those cases in which the rectus muscle or the rectus sheath was sutured to the inguinal ligament, there was a 25.8% recurrence.

It would seem that, at the present time, the best one can expect in the treatment of a direct hernia is a recurrence rate of approximately 10%. This is in sharp contrast to the recurrence rate of approximately 2% which is fairly uni-

versally reported by surgeons treating the indirect type.

ETIOLOGY OF RECURRENCE

The factors responsible for recurrence of inguinal herniæ are still not clearly understood. Many theories have been advanced and a multitude of operative procedures have been devised in an attempt to repair more successfully the direct variety of hernial defects, each author claiming success for his particular method of repair. Two main schools of thought on this subject have developed in the past 50 years. At first the proponents of each advocated their own type of operation to the exclusion of any other procedure, thus, Kocher[5] in 1892 advocated the transposition and invagination of the peritoneal sac. He claimed as low a recurrence rate as did Bassini[6] in 1888 who stressed the repair of the inguinal canal. Slowly, over a period of years, the majority of surgeons have concentrated on improving methods for the repair of the inguinal canal. Relatively, very few surgeons have considered improving the handling of the peritoneal sac. It is, however, agreed by all surgeons who lay stress upon the repair of the inguinal canal that the peritoneal sac should be ligated as high as possible.

A review of the modern literature reveals that Kocher[5] in 1892 was the first to suggest transposition of the hernial sac. By this method the sac was freed from its cord and the non-opened fundus grasped by a curved dressing forceps and pushed through the internal ring behind the anterior abdominal wall. It was brought out through an incision made in the abdominal wall about the level of the internal ring. In this way the sac was invaginated and transplanted through a new opening in the abdominal wall, transfixed, ligated and the excess sac cut away. The stump was then sutured to the outer surface of the aponeurosis of the external oblique muscle.

Kocher reported 76 cases thus treated with a 2.7% recurrence rate. He maintained throughout that the only repair of a hernia that was necessary was the repair of the hernial sac, and that there was no need to repair the floor of the inguinal canal.

During the succeeding years the principle of high ligation of the hernial sac was generally accepted and adopted by most surgeons. The method of transposition of the peritoneum, as first suggested by Kocher, has received slight support. Unfortunately, high ligation of the sac is difficult to do in the case of the direct hernia because of the fascia transversalis and the urinary bladder.

Laroque in 1919,[7] 1924,[8] 1927[9] and 1932[10] once again brought the question of the treatment of the peritoneal sac to the foreground. He introduced a transperitoneal approach for the treatment of indirect inguinal and femoral herniæ. Following the usual inguinal incision he entered the peritoneal cavity through a split muscle incision placed about one inch above the internal inguinal ring. Through this incision he removed the hernial sac, closing the peritoneal cavity in the same manner as following an ordinary abdominal muscle splitting operation. Laroque was most enthusiastic about his procedure. He removed the appendix in 6% of 1,200 cases of abdominal herniæ upon which he operated. It should be noted here that the bulk of the cases operated upon by Laroque were of the indirect inguinal variety. The Laroque operation has been carried out with minor modifications by other surgeons, namely, Sutton[11] in 1936, Harrison[12] in 1940, Willis[13] in 1940 and Collins[14] in 1942. Both Collins and Willis open the sac and bring it through the incision in the peritoneal cavity by a process of inversion. Collins, like Kocher, sutures the stump of the sac to the edge of the opening in the transversalis fascia and peritoneum; Willis sutures the sac to the external oblique fascia.

It should be noted here that the original Kocher operation transposes the hernial sac without opening it and without any dissection of the peritoneum. In addition to this the stump of the sac is not securely buried. The latter criticism also applies to the operation of Collins and Willis. The Laroque procedure, unquestionably, is of value in the indirect variety of inguinal herniæ and in those cases where the sac is freed with comparative ease. We find it difficult to visualize the repair of a direct hernia by this method and also a repair of the large, indirect inguinal hernial sac which is adherent.

In all of the previously described operations, except the Kocher procedure, the peritoneal cavity is opened in two places. Once at the fundus of the sac and, secondly, at the site of the transposition of the sac through the split in the abdominal muscle. None of the aforementioned procedures are easily applied to the direct variety of herniæ.

THEORETICAL CONSIDERATIONS

The biological reasons for the development of direct herniæ are still not quite clear. There are certain anatomical facts, however, which cannot be disregarded. The first and foremost of these is the funnel-like shape of the inguinal canal and of the peritoneum on either side of the bladder (Fig. 1A). This, apparently, is the result of man assuming the upright position; although in the quadripeds there is a processus funicularis, there is no transversalis fascia, conjoined tendon or Hesselbach's triangle. These structures seem to have developed with the evolution of man. The peritoneum is loosely attached to the transversalis fascia in the lower abdomen, with the result that there is considerable redundancy and a tendency for the formation of pockets and folds. By virtue of these two factors the direct variety of herniæ requires that the peritoneal redundancy and funnel-like shape be removed before it is possible to expect a permanent cure of the direct hernia. It is obvious that in a rare case of direct hernia which is entirely extraperitoneal there is no sac, the protrusion being that of bladder and properitoneal fat.

Such types of hernia can only be cured by repair of the inguinal canal. However, in most of the herniæ of the direct variety with which I have dealt, the handling of the peritoneal sac presented a difficult problem. I have never been satisfied with the usual procedure of dissecting the sac as deeply as possible and ligating it *in situ*. It has always seemed to me that by this procedure all that is accomplished is to decrease the size of the peritoneal funnel which is protruding into the inguinal canal. In no way does it prevent further prolongation and extension of the funnel-like peritoneal process.

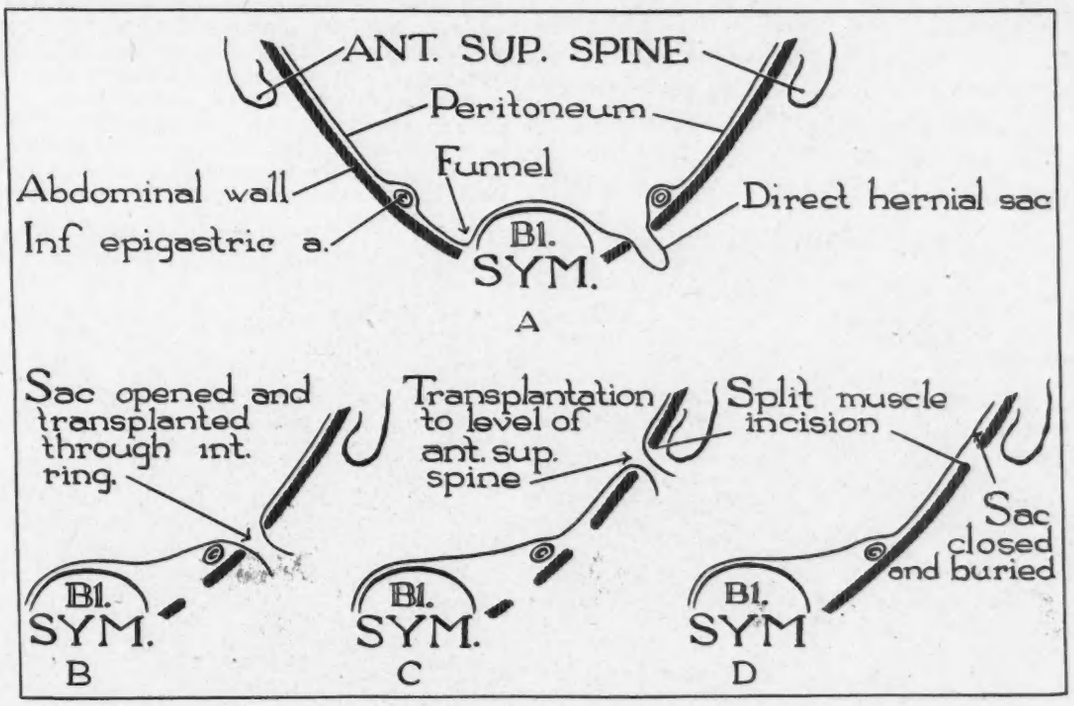

Fig. 1.—(A) Shows direct hernia and normal funnel shape of peritoneum in the inguinal region. (B) Peritoneal sac transplanted above the inferior epigastric vessels. (C) Peritoneal sac transplanted through split muscle incision at level of anterior superior iliac spine. (D) Peritoneal sac tied and stump buried under the abdominal muscles above the level of anterior superior iliac spine.

IMPORTANCE OF THE PERITONEUM

In support of this thesis, one has only to consider the hernial recurrence which occurs following a good fascial repair of the inguinal canal. Many of these recurrences seem to be due to a protrusion of the peritoneum between strips of fascia.

For many years I have been impressed by the tendency of the peritoneum to keep pushing itself into the operative field during the repair of the inguinal canal. In many cases it has been necessary to push the peritoneum away in order to approximate the conjoined tendon and internal oblique muscle to the reflected edge of Poupart's ligament.

TRANSPLANTATION OF THE PERITONEAL SAC

Objective.—In the operative procedure described below, the objective is to obliterate the funicular peritoneal process which protrudes into the inguinal region, thence through Hesselbach's triangle. We are of the opinion that in many cases of indirect hernia there is an associated direct hernia which is overlooked and which has been referred to as the "pantaloon" or the "saddle bag" type. In order to repair these types of herniæ, the two hernial sacs or peritoneal protrusions should be converted into one and dissected free from surounding structures so that it can be pulled out of the inguinal canal. The peritoneal protrusion of the direct type of hernia should be handled in the same manner so as to obliterate the indentation of the peritoneum in the region of the inguinal canal. It is felt that in thus removing the peritoneum from the region of the inguinal canal one of the factors responsible for the hernial recurrence can be removed.

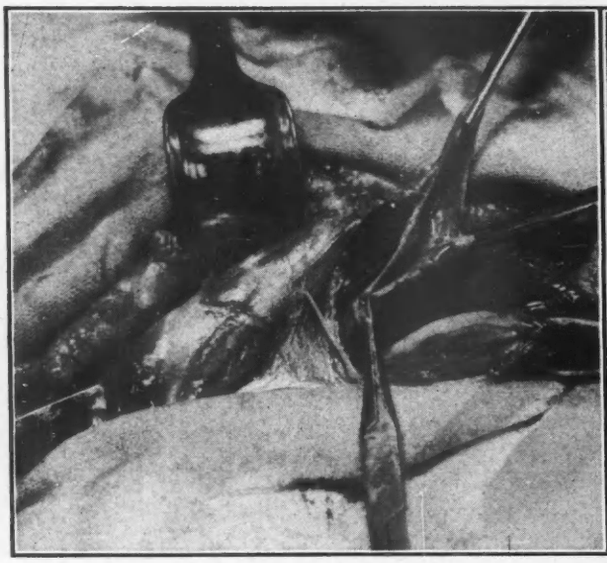

Fig. 2

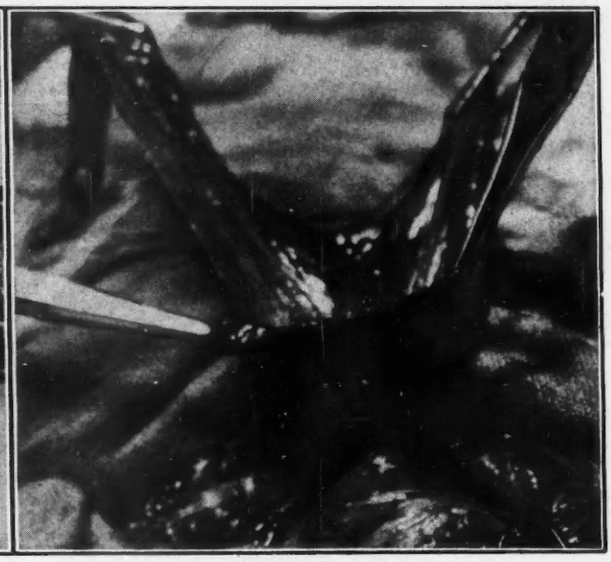

Fig. 3

Fig. 2.—This shows a Kelly forceps passed through the split muscle incision beneath the abdominal muscles into the inguinal canal and about to take up the free edge of the peritoneal sac. **Fig. 3.**—This shows the peritoneal sac transplanted to its new position at the level of the anterior superior spine through the split muscle incision.

OPERATIVE TECHNIQUE

DIRECT HERNIA

1. *Incision.*—From the anterior superior iliac spine to the pubic spine through skin, subcutaneous tissue and external oblique aponeurosis.

2. *Isolation of sac.*—The transversalis fascia is carefully split and dissected free from the peritoneal sac. The peritoneal sac which is usually covered by properitoneal fat is difficult to find. It is best to seek it below the inferior epigastric vessels rather than in the inframedial aspect of the canal because of the difficulties in identifying the bladder.

3. *Dissection of peritoneal sac from bladder.*—Once the peritoneal sac has been identified it is opened and the index finger inserted into its distal portion. In this way by hooking of the index finger the peritoneal sac can be placed under tension, thus facilitating its dissection from the bladder.

4. *Dissection of peritoneal sac from the inferior epigastric vessels.*—By careful dissection more of the peritoneal sac is obtained. After the sac is well separated from the bladder it is dissected away from the inferior epigastric vessels.

5. *Transplantation of peritoneal sac beneath the inferior epigastric vessels.*—This is carried out so that the entire peritoneal sac comes to lie lateral to the vessels.

6. *Split muscle incision in abdominal muscles.*—Once the sac lies completely lateral to the inferior epigastric vessels further dissection is carried out. A split muscle incision, three-quarters of an inch long, is made through the internal oblique and transversus abdominis muscles at the level of the anterior superior iliac spine. The peritoneum is not opened.

7. *Transplantation of the peritoneal sac to the level of the anterior superior iliac spine.*—The index finger is passed through the split in the abdominal muscles downwards into the inguinal canal anterior to the peritoneum. A Kelly clamp is passed through the same split muscle incision deep to the transversalis fascia, between it and the peritoneum downwards into the inguinal canal (Fig. 2). The free edge of the peritoneal sac is then grasped in the Kelly forceps and drawn upwards deep to the muscular layers of the anterior abdominal wall. It is brought out through the split muscle incision at the level of the anterior superior iliac spine (Fig. 3). Eventually the entire peritoneal sac comes to lie at the level of the anterior superior iliac spine and the excess peritoneum is drawn well in the sac. A finger inserted into the peritoneal cavity at this juncture will reveal that the funnel shaped process (Fig. 1A) which usually descends into the inguinal canal is no longer present. Any redundancy of the peritoneum has now been pulled into the sac. The peritoneum now stretches tautly from the bladder to the anterior superior iliac spine (Fig. 1C).

8. *Closure of the peritoneal sac.*—The peritoneal sac is closed in its new position at the level of the anterior superior iliac spine. Usually a transfixion suture is

sufficient but when the opening is large it is closed with a continuous suture while an assistant pulls on the sac wall.

9. *Burying of the peritoneal stump (Fig. 1D).*—Once the peritoneum is closed excess sac is cut away and the stump is buried beneath the abdominal muscles about three-quarters of an inch above the level of the spit muscle incision.

10. *Closure of the transversalis fascia.*—Following the transplantation of the peritoneum and closure of the sac the fascia transversalis is closed. Care must be taken to make certain that the transversalis fascia is sutured above the inguinal canal. The transversalis fascia is closed with a continuous suture which commences at the level of the anterior superior iliac spine, the first stitch being inserted through the split muscle incision just below the buried peritoneal stump. From there it is carried downwards beneath the abdominal muscles to effect a closure of the fascia transversalis in the cord. A second continuous suture is used to close the transversalis fascia between the cord and the pubic spine.

11. *Repair of the inguinal canal.*—The repair of the inguinal canal in our cases has been carried out with fascial strips. These have been taken either from the fascia lata of the opposite leg or from the medial leaf of the external oblique aponeurosis. It has been used to suture the conjoined tendon to the iliopectineal ligament, and the internal oblique muscle to the reflected edge of the inguinal ligament. The fascial strip is carried to the medial upper side of the cord, through the internal oblique muscle and anchored to the external oblique aponeurosis above the deep abdominal ring. In the indirect herniæ where the sac has been transplanted and there is no evidence of associated direct hernia the same type of repair of the inguinal canal is carried out using chromic sutures. In all cases the external oblique aponeurosis has been closed superficial to the cord.

INDIRECT HERNIA

If the hernia is of the indirect variety the hernial sac is first isolated from the cord structure and opened. It is necessary to dissect the sac carefully down to the level of the peritoneum before any estimate can be made as to the size of the sac mouth. Not infrequently the sac appears to be small and when dissected down to the level of the peritoneum it is found to have a large mouth. In order to ascertain as to whether or not there is an accompanying direct hernia the index finger is inserted through the sac down into the peritoneal cavity in such a manner as to have the tip push anteriorly through Hesselbach's triangle. If the index finger is placed within the peritoneal cavity pushing forward through Hesselbach's triangle, the looseness of the peritoneum in this region may be demonstrated. The inferior epigastric vessels are well visualized separating the direct and indirect sacs. In this type of hernia, "pantaloon", the entire sac is dissected carefully away from the transversalis fascia and slowly, by hooking the index finger in the sac, the peritoneum is pulled from below upwards into the wound. Eventually the peritoneum which made up the protrusion of the direct hernia is removed from Hesselbach's triangle. In this way all the peritoneum within the inguinal canal, which is medial to the inferior epigastric vessels, comes to lie in a position lateral to them. After this has been accomplished the peritoneal sac is treated in the same manner as has been described for the direct type of hernia.

DISCUSSION

In this report we are unable to quote any result of this type of operation. The first case in our series was operated upon on July 3, 1944. We have since carried out the transplantation operation of the peritoneum in a total of 34 cases. Of these, 7 were direct herniæ, 20 were indirect, and 6 were a combination of the direct and indirect types. One was a large femoral hernia. There have been no unusual complications. We have been impressed by the absence of bladder symptoms following the transplantation of the peritoneum in the cases of direct hernia. In a few bilateral cases the patients have volunteered the information that the side with the transplanted peritoneum was much more comfortable than the opposite side upon which the usual hernial repair had been done.

CONCLUSION

We believe this method of dealing with the hernial sac is important. It straightens out the funnel-shaped process normally present in the inguinal region and removes the peritoneum from this area. It should be stated that the procedure is not easy and requires a most careful dissection. We feel it should not be undertaken by beginners or by inexperienced workers. It is a method reserved for the treatment of a direct hernial sac, certain large indirect or combination of direct and indirect herniæ. It should not be used in small, indirect herniæ where high ligation of a narrow sac yields excellent results, nor do we feel it should be used in children. For those who have their own particular method of repairing the inguinal canal this method of dealing with a peritoneal sac in no way interferes with their particular procedure. It is advanced as a better and sounder method of dealing with the peritoneal sac. The repair of the inguinal canal can be left entirely to the discretion of the surgeon.

The author wishes to thank the Directorate of Public Relation (Army) by whom the above published photographs were made).

This work was done on the author's Surgical Service at the Montreal Military Hospital, Ste. Anne de Bellevue, Quebec.

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ANTHRAX: ITS INCIDENCE AND THERAPY

(With the Report of a Case)

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AS anthrax is a comparatively rare disease in this country, publication of a ease recently observed seems to be justified.

CASE REPORT

D.R., 5 years of age, was seen on July 1, 1944. The parents gave the following history: on the previous day they noticed a small boil on the child's neck with swelling which rapidly increased. The child was not complaining of any discomfort or pain, and did not feel ill in any way. No previous illnesses.

Physical examination: white female child of good general development, weight 50 lbs. Patient is alert and responsive, no complaints of any nature. Oral temperature 102.4° F., pulse 118, regular, of good quality. Inflammatory lesion present in the right submental region, the lesion consisting of a blister measuring about 0.7 cm. across, surrounded by an area of induration of approximately 3 cm. in diameter, and considerable non-pitting œdema which extends above to the right ear, and across the neck well beyond the midline to the left. The

wall of the blister is only partly intact, some of its floor being therefore visible: it is of a peculiar fleshy character, and exudes a serous fluid; a moderate erythema fading into the neighbourhood surrounds the blister. The lesion itself, and the surrounding induration are absolutely painless when pressed upon with a probe. All other organs are normal.

In view of the atypical picture offered by this "boil", the large area of induration, the œdema and high temperature on the one side; the indolence of the lesion, the absence of suppuration and the remarkable euphoria of the patient, on the other, it was felt that the condition represented more than a simple pyogenic infection.

The past history was therefore gone over in detail again, and the following additional information was gained: about two weeks previous to the onset of the child's disease two cows died on the farm on which the child lived. One of these cows had been skinned, and the hide was left out in the open. The parents conjectured that the child had been scratched by a cat which had been in contact with the cowhide.

The child was admitted to the hospital and isolated; compresses of potassium permanganate 1/10,000 were applied locally to the lesion, and an initial dose of sulfathiazole gm. 3 was administered by mouth. Meanwhile a smear was taken from the serous fluid exuding from the floor of the blister: it showed many large bacilli, single and in "bamboo pole" formation, in most of the micro-organisms a surrounding capsule could be recognized. In view of these findings, together with the case history and the clinical picture a diagnosis of cutaneous anthrax was made. Swabs were forwarded at the same time to the Provincial Laboratory, University of Alberta, and the diagnosis was confirmed by culture, *Staph. pyogenes aureus* being a concomitant finding.

In view of favourable reports of treatment of anthrax with sulfonamides, it was decided to continue with the sulfathiazole medication; at the same time it was tried to procure antianthrax serum. Serum proved not to be available anywhere in Western Canada at that time, however the following day a supply of penicillin was obtained. Novarsan was administered on July 2, and on July 3 antianthrax serum (for veterinary use), was supplied to us, and given to the patient at once by intravenous route. A graphic chart of temperature and pulse, and the therapeutic procedures and progress notes for the first week in tabular form are presented in Table I and Chart 1.

On July 8 the patient developed a rash of urticarial nature of a few hours' duration, and was for a few days off and on vaguely complaining of abdominal pain, but otherwise her further recovery was entirely uneventful. Blood and stool culture fortunately proved to be negative. There was considerable loss of tissue at the site of the original lesion, and five weeks after onset of the disease the eschar was still adherent with a broad pedicle. Early in August the patient left the district, and a further follow-up was impossible.

DISCUSSION

The source of infection, and its mode of transfer to the child could not be established with certainty. The veterinary authorities exhibited a remarkable scepticism regarding the diagnosis of anthrax, obviously labouring under the influence of an "It cannot happen here" mental attitude. Anthrax bacilli eventually were isolated from one of the specimens taken from the carcasses, but the whole question was more or less left in abeyance. No bacilli could be isolated from claws, mouth or tissues of several cats, one of whom allegedly had scratched the child; of course the transmission of the disease to the child could have been made by other means, for instance by the bite of insects. It was furthermore alleged that in the last year there was a marked reduction in the gopher population on the farm in question, and an epizootic, possibly of anthrax was conjectured; however no further investigations have been made concerning this point. Artificial fertilizer[9] and imported feedstuffs[9, 13] are said to be responsible for some outbreaks of agricultural anthrax, but neither of these agents had been employed on that particular farm. The theory that anthrax spores, which are very resistant

and can survive in the soil for almost two decades, may have been activated, does not bring the problem closer to a satisfactory solution. At any rate, no case of human anthrax has been observed here since, and so far as we know there was no further outbreak amongst domestic animals.

The temperature of our patient, as high as 104.4° by rectum, is unfrequently reached in cutaneous anthrax infections. Only 3 of 19 cases reported by Lucchesi[10] reached a temperature of 103°, and one of these had a bloodstream infection. The euphoria of the patient when seen first was typical;[4] later in the course of the disease she offered however the picture of a gravely ill person. While the necrotic area usually detaches itself in about two weeks, in our case after five weeks there was still a firmly adherent core present; the amount of scar formation could not be observed, but it stands to reason that it would be sizeable judging from the amount of tissue lost. This does not seem to be a common occurrence in serum treated cases: Legge[9] reports on 42 cases, in 40 of which the scar formation was graded from "light scar" to "no visible scar" and "completely cured".

The therapeutic measures adopted in the presented case may be called by the benevolent "multiple therapeutical approach", and "therapeutic polypragmasia" by the malevolent. For

TABLE I.

THERAPEUTIC PROCEDURES AND PROGRESS NOTES, FIRST WEEK

Date	*Time*	*Systemic treatment*		*Local treatment*	*Progress notes*
July 1	5.00 p.m.	Sulfathiazole	gm. 3.0	$KMnO_4$ 1/10,000	
	11.00 p.m.	Sulfathiazole	gm. 0.5	$KMnO_4$ 1/10,000	
July 2	2.00 a.m.	Sulfathiazole	gm. 0.5	$KMnO_4$ 1/10,000	Œdema increasing. Some purulent discharge from pustule.
	6.00 a.m.	Sulfathiazole	gm. 0.5		
	10.00 a.m.	Sulfathiazole	gm. 0.5		Child seriously ill, irrational at intervals.
	2.00 p.m.	Sulfathiazole	gm. 0.5	$KMnO_4$ 1/10,000	
	6.00 p.m.	Sulfathiazole	gm. 0.5		
	9.30 p.m.	Penicillin	5,000 U. i.v.	Penicillin 1/16	
		Penicillin	5,000 U. i.m.	Penicillin 1/16	
July 3	0.30 a.m.	Penicillin	5,000 U. i.m.	Penicillin 1/16	Centre of lesion necrotic, of black colour. Hæmorrhagic area surrounding the core. Appearance of hæmorrhagic blisters.
	3.30 a.m.	Penicillin	5,000 U. i.m.	Penicillin 1/16	
	6.30 a.m.	Penicillin	5,000 U. i.m.	Penicillin 1/16	
	9.30 a.m.	Penicillin	5,000 U. i.m.	Penicillin 1/50	
	10.00 a.m.	Novarsan	0.3 gm. i.v.	Penicillin 1/50	
	12.30 p.m.	Penicillin	7,500 U. i.m.	Penicillin 1/50	Œdema perhaps slightly decreased. Vomited several times. Condition grave. 8 p.m. chill, intermittent pulse–Coramine 1 c.c. by hypo. Improved.
	3.30 p.m.	Penicillin	7,500 U. i.m.	Penicillin 1/50	
	6.00 p.m.	Antianthrax serum equine	100 c.c. i.v.	Penicillin 1/50	
		Penicillin	7,500 U. i.v.	Penicillin 1/50	
		Glucose saline	400 c.c. i.v.		
	11.30 p.m.	Penicillin	7,500 U. i.m.	Penicillin 1/50	
July 4	2.30 a.m.	Penicillin	7,500 U. i.m.	Penicillin 1/50	Child sleeping at long intervals.
	5.30 a.m.	Penicillin	7.500 U. i.m.	Penicillin 1/50	Œdema definitely decreasing hæmorrhagic halo diminishing. (Fig. 1.)
	8.30 a.m.	Penicillin	7,500 U. i.m.	Penicillin 1/50	
	11.30 a.m.	Penicillin	7,500 U. i.m.	Penicillin 1/50	
	2.30 p.m.	Penicillin	7,500 U. i.m.	Penicillin 1/50	Child bright and talkative no reaction from administration of serum.
	6.30 p.m.	Antianthrax serum bovine	50 c.c. i.v.	Penicillin 1/50	
		Penicillin	7,500 U. i.v.		
		Glucose saline	100 c.c. i.v.		
	9.30 p.m.	Penicillin	7,500 U. i.m.	Penicillin 1/50	
July 5	0.30 a.m.	Penicillin continued o.h. 3	7,500 U. i.m.	Penicillin 1/50	Evacuation of black, tarry stools. Complaining of pain in epigastrium and lower abdomen. Refuses nourishment. Fæces and blood forwarded for culture.
	5.30 p.m.	Antianthrax serum bovine	50 c.c. i.m.	Penicillin 1/50	
July 6		Penicillin continued o.h. 3	7,500 U. i.m.	Penicillin 1/50 discontinued 12.30 p.m.	Site of intramuscular injection of serum quite painful. Pain in lesion and back of neck. Kernig's sign negative. Feeling well later in the day. Stools normal, no abdominal complaints.
July 7		Penicillin o.h. 3—discontinued 12.30 p.m.	7.500 U. i.m.		Feeling very well. Occasional complaints of epigastrial pain.

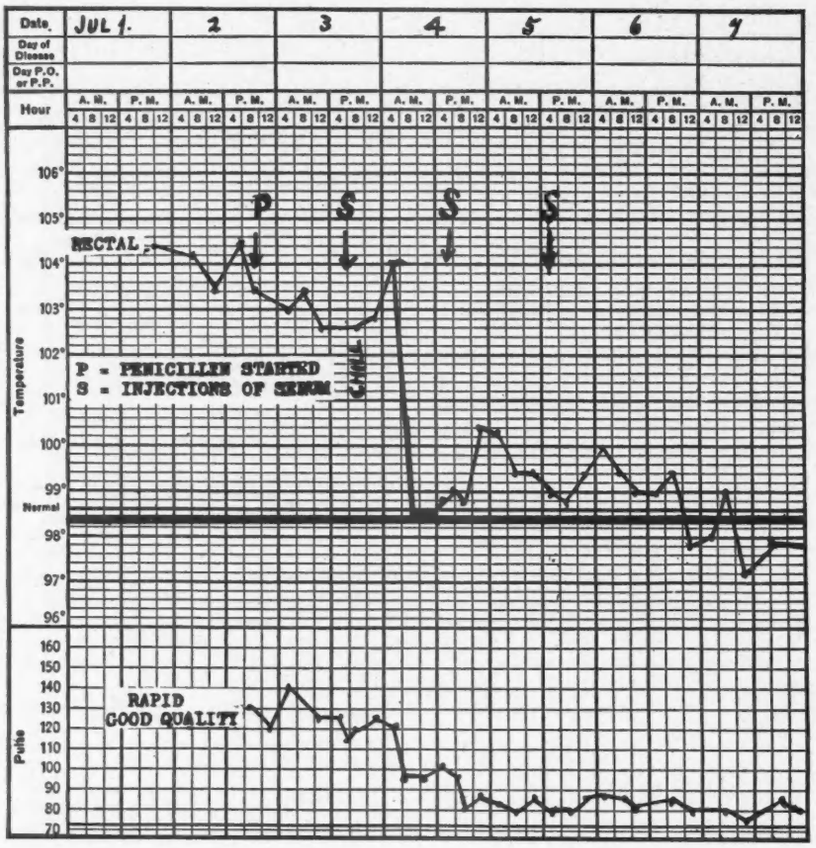

Chart 1. — Graphic chart of temperature, pulse and respiration. First week of disease.

explanation it may be added that our practical experience with anthrax was nil, the specific literature available at the time rather sketchy, and the general condition of the child definitely alarming.

The dosage of the sulfathiazole was probably sufficient, although not "large" as is recommended; but its administration was certainly not long enough sustained; it was discontinued after 24 hours, after a total of 6.0 gm. had been administered.

Our patient appears to be the first case of human anthrax treated with penicillin. Most probably this drug was not administered long enough to allow of a definite statement, but its effect was certainly not spectacular. Until serum was adminstered the patient received 45,000 Florey units within 18 hours; it is questionable if the doubtful slight decrease of œdema and the drop in temperature should be credited to this. Because of the seriousness of the patient's condition, especially in view of the symptoms suggesting intestinal anthrax, and as only a limited quantity of serum was available it was decided to maintain the penicillin treatment until the condition had unequivocally and definitely improved. Local injection of penicillin into the pustule was suggested, but we were not impressed with the idea; the literature subsequently surveyed justified our stand. The local application of penicillin to the pustule did not seem to influence the lesion at all, it was found somewhat irritating by the patient.*

No antianthrax serum for human use could be obtained until the child was well on her way to recovery, however two packages of 100 c.c. each of serum for veterinary use were supplied to us; the sera were of bovine and equine origin respectively. Intradermal tests were performed previous to the administration of the serum: they were negative, there was no past history suggestive for allergic symptoms.

The various parenteral administrations elicited most violent resistance from our little patient, and we had to do entirely without the beneficial influence of rest to the inflammatory lesion.

Statistical Data Regarding the Incidence of Anthrax in Europe and the United States

Anthrax is geographically and zoologically the most widespread of all the infectious diseases.[18] While it is quite common in many European countries, and not a rarity in the United States, it seems to be unfrequently met with in Canada. Its incidence in a number of

* After completion of this paper (October 9, 1944) a report on "Treatment of human anthrax with penicillin" has been published by Murphy, LaBoccetta and Lockwood (*J. Am. M. Ass.*, **126:** 948, 1944). The authors treated three cases of human anthrax in November and December, 1943. All cases were cutaneous, in two cases the site of the lesion was the forearm, in one case the face. The clinical response to penicillin treatment was "exceedingly prompt and excellent" in all cases. The authors believe that 100,000 units of penicillin is the minimum effective dose in the uncomplicated case of cutaneous anthrax. They further come to the conclusion that different strains of *B. Anthracis* may vary widely in their sensitivity to penicillin. They believe that penicillin will acquire a prominent place in the treatment of anthrax and that further clinical trial is warranted.

European countries during the last two available five-year periods is given in Table II. The source of the data is the Epidemiological Report of the League of Nations, as supplied by the Dominion Bureau of Statistics—no copies of this report subsequent to 1938 are available at the time.

U.S.S.R.—this decrease undoubtedly is due to rigid preventive measures taken in that country.[19] If the figures from the European U.S.S.R. are deducted, the decrease of anthrax in the remaining countries amounts to about 8% from the earlier to the later five year period.

Data concerning the incidence of anthrax in

TABLE II.

INCIDENCE OF ANTHRAX IN SOME EUROPEAN COUNTRIES, 1928 - 1937

	Year						
	1933	*1934*	*1935*	*1936*	*1937*	*Total 1933 - '37*	*Total 1928 - '32*
Austria	12	15	25	15	33	100	83
Bulgaria	921	1,111	1,047	909	837	4,825	3,759
Czechoslovakia	51	59	57	68	65	300	558
England and Wales	4 (c)	13	8 (c)	2 (c)	5 (c)	32	38 (c)
Germany	84	80	90	69	90	413	774
Hungary	163	241	267	233	270	1,174	(d)
Italy	1,427	1,155	1,252	1,058	1,135	6,027	8,950
Poland	31	50	51	50	69	251	346
Romania	937	1,218	1,725	1,840	2,277	7,997	6,694
Switzerland	4	1	2	4	1	12	3
Turkey (a)	425	590	682	568	751	3,016	(d)
U.S.S.R. (b)	2,177	1,881	1,445	1,759	(d)	7,262	33,625 (e)
Yugoslavia	727	718	788	771	527	3,531	4,289

(a) Including Asiatic territory.
(b) European part only.
(c) Deaths.
(d) Not available.
(e) Includes for matter of comparison the four-year period 1929-'32; less figures for Ukraine 1931 (not available).

No figures for the Western European countries could be obtained; as they are, the figures given in Table II show a considerable preponderance of anthrax in South Central Europe and the U.S.S.R. A comparison of the total numbers of anthrax cases reported during the last two available five year periods is given in Table III. In comparing these totals a 49% reduction of reported anthrax cases can be noticed from the earlier to the later five year period; this reduction is mainly explained by the enormous decrease of cases reported from the European

TABLE III.

COMPARISON OF THE TOTAL NUMBERS OF REPORTED ANTHRAX CASES DURING THE LAST TWO AVAILABLE FIVE YEAR PERIODS (AS PER TABLE II.)

Total cases for 11 European countries reported during 1928 - '32	59.114	(f,g)
Total cases for 11 European countries reported during 1933 - '37	30,750	(f,h)
Decrease of reported cases in %	49	
Figures for U.S.S.R. deducted from above 1928-'32 period (g)	25.489	
Figures for U.S.S.R. deducted from above 1933-'37 period (h)	23,488	
Decrease for 10 European countries, deducting U.S.S.R, in %	7.9	

(f) Hungary and Turkey omitted.
(g) Includes four year period 1929-'32 (less figures for Ukraine 1931) for the U.S.S.R.
(h) Includes four year period 1933-'36, for the U.S.S.R.

the United States by years and in five-year periods, and mortality rates for the five-year periods are given in Tables IV and V; no complete or almost complete figures for the yearly incidence of anthrax prior to 1930 were available. The figures in Table V show a considerable

TABLE IV.

YEARLY INCIDENCE OF ANTHRAX IN THE UNITED STATES 1930 - 1943 (DOMINOIN BUREAU OF STATISTICS)

1930	80	1937	65
1931	63	1938	(b)
1932	56 (a)	1939	57
1933	49 (a)	1940	75
1934	49 (a)	1941	96
1935	61	1942	72
1936	77	1943	67

(a) 47 States and D.C.
(b) Not available.

TABLE V.

INCIDENCE OF ANTHRAX IN THE UNITED STATES IN FIVE YEAR PERIODS, 1919 - 1943.

(1919 - '38, United States Public Health Service, supplemented by H. F. Smyth as quoted in Cecil's "Textbook of Medicime", 6th ed. 1939 - '43, Dominion Bureau of Statisitics).

		Mortality rate %
1919 - 1923	461	23.0
1924 - 1928	468	20.0
1929 - 1933	379	22.0
1933 - 1938	375	16.0
1939 - 1943	367	not available

reduction of the incidence of reported anthrax from the five-year period 1924 to 1928 to the immediately following five-year period, this decrease amounts to 89 cases or 19%. However, the first two and the last three five-year periods respectively compared with each other show a remarkable constancy in the number of cases.

This information is presented in tabular form in Table VI. A total of 24 cases were collected; the records of the Dominion Bureau of Statistics concerning communicable diseases go back to 1924 only, and, with the exception of Manitoba, no cases prior to that date could be established by contacting the various Departments of

TABLE VI.

SURVEY OF ANTHRAX CASES REPORTED IN CANADA

Year	*New Brunswick*	*Quebec*	*Ontario*	*Manitoba*	*Saskatchewan*	*Alberta*	*British Columbia*
1920	....	....	....	1 (c,e,g,h)	....	....	....
1921	....	....	....	1 (c,e,g,h)	....	....	....
1922-'24	....	....	....	....	....	....	....
1925	1 (a,k)	....	....	....	....	....	....
1926	....	....	....	....	....	....	....
1927	....	....	....	....	1 (k)	....	....
1928	....	....	....	....	....	1 (c,d,e,g)	....
1929	....	....	....	1 (c,e,f,h)	....	....	....
1930	....	....	....	....	....	....	....
1931	....	....	....	....	1 (c,e,g,h)	....	1 (c?,k)
1932	....	....	....	....	....	....	....
1933	....	....	....	....	....	....	1 (a,d,g) 1 (k)
1934-'35	....	....	....	....	....	....	....
1936	....	3 (c,d,e,f) 1 (a,d,e,f)	2 (c,d,e,f)	....	....	....	....
1937	....	....	....	....	1 (i,k)	....	....
1938	....	1 (c,d,e,f)	....	....	....	....	....
1939	....	....	....	1 (a,e,h,j)	....	....	....
1940	....	....	....	....	....	....	....
1941	....	....	1 (c,d,e,f)	....	1 (k)	....	....
1942	....	....	....	....	1 (i,k)	....	....
1943	....	1 (c,d,e,f)	....	....	....	1 (c,f?,m)	....

(a) Died.
(c) Survived.
(d) Confirmed by culture.
(e) Serum used.
(f) Localization on hands or arms.
(g) Localized on face.
(h) Confirmed by smear only.
(i) No anthrax found in submitted specimen.
(j) Multiple lesions.
(k) No further information available.
(m) No bacteriological examination performed.

SURVEY OF 24 CASES OF ANTHRAX REPORTED IN CANADA 1920 TO 1943

From the Dominion Bureau of Statistics, and by contacting the individual Departments of Health of the nine provinces, data were collected regarding reported anthrax cases in Canada.

TABLE VII.

MORTALITY RATES

(a) Cases with known outcome.	
Total of cases	19
Deaths	4
Mortality rate	22.2%
(b) Cases with known outcome bacteriologically confirmed.	
Total of cases	17
Deaths	3
Mortality rate	18.8%
(c) Cases treated with serum.	
Total of cases	15
Deaths	2
Mortality rate	13.3%

Health. Nova Scotia has no case on record "for a good many more than thirty years", and no case ever has been reported in Prince Edward Island—therefore these two Provinces have been omitted from Table VI.

The number of cases reported here is too small to put much emphasis on percentages, but as they are, these figures of 18.8 and 22.2% respectively are in line with the mortality rates for the United States as quoted in Table V. To one of the two fatalities receiving serotherapy the serum was administered with the patient in a practically moribund state; excluding this case we arrive at a fatality rate of 7.1% for cases treated with serum. All cases treated with serum had their diagnosis bacteriologically confirmed.

While there is no striking difference between the incidence of anthrax in Europe and the United States,[19] there seems to be a striking discrepancy of its incidence between the neighbour-

TABLE VIII.

COMPARISON OF INCIDENCE OF ANTHRAX IN THE UNITED STATES AND CANADA, 1924 - 1943

(A) Total of reported cases in the U.S. 1924-1943	1,589
(B) Total of reported cases in Canada 1924-1943	22
(C) Absolute ratio of reported cases U.S. to Canada	72.2 : 1
(D) Approximate ratio of the total population U.S. to Canada	11.5 : 1
C divided by D gives:	
(E) Relative ratio of reported cases U.S. to Canada	6.3 : 1

ing countries Canada and the United States. Table VIII seems to bear this out.

During the last twenty years the absolute incidence in the United States was some seventy times higher than in Canada; making allowance for the numerical difference in population between the two countries, one is lead to assume that the relative incidence of anthrax over a twenty-year period is over six times greater in our neighbour to the south. The higher industrialization of the United States may be responsible for part of this higher incidence. Percentages as to the source of infection during the five-year period 1929 to 1933 are given in Table IX for the United States, and in Table X for this country.

TABLE IX.

PERCENTAGES OF ANTHRAX CASES REPORTED AS TO SOURCE OF INFECTION. 225 CASES REPORTED BY 19 STATES, 1929 - 1933. SMYTH (19)

Skins and hides tanneries	32.0%
Wool	30.0%
Animals, agriculture	26.0%
Hair and fur	7.0%
Animal products, transportation	2.0%
Brushes	2.0%
Laboratory infections	1.0%

TABLE X.

PERCENTAGES OF ANTHRAX AS TO SOURCE OF INFECTION. 11 CASES, CANADA, 1920 - 1943

Skins and hides	9.1%
Animals, agriculture	36.3%
Brushes	36.3%
Laboratory infections	18.2%

In only 11 cases of our series could information of some kind be gained as to the possible source of infection. Because of the smallness of this series and the different periods of time included in Tables IX and X it is not intended to draw any conclusions whatever regarding the sources of infection in Canada. Industrial anthrax seems to be absent but no information regarding this point could be gained in the remaining 13 cases. Only one of the four brush infections could be bacteriologically confirmed: in one case the incriminated brush had been destroyed before it could be examined, in another case the only clue to the source of infection was the localization of the lesion in the shaving area.

But, coming back to the surprisingly low incidence in Canada: the lower industrial development of our country does not explain this fact fully, nor do geographical differences give a full explanation. Legge[9] remarks: "Factors which must not be left out of consideration, as they form important links in the chain of the creation of anthrax districts, are the insect, bird, and animal life, and the occurrence of dust storms". In the same paper he quotes Wilhelm Koch: "Height above the level of the sea matters little, but a definite temperature must be reached at which the growth of the bacillus and formation of spores can take place, that is, between 18 and 40° C. For a typical anthrax district is required only, in addition to the bacillus, a degree of moisture in the soil greater than of the surrounding country, periodical high temperatures, and profuse vegetation." These requirements seem to be fulfilled in Canada as well as in the United States.

In this connection it may be interesting to remark that outbreaks of anthrax amongst domestic animals are just about as rare in Canada as cases of human anthrax.

While small outbreaks are reported from Ontario and Quebec in rather frequent intervals, there have been only 19 cases reported during the last 41 years from the rest of the Dominion: 5 from the Maritimes, and 7 from the Prairie Provinces and British Columbia each. Since 1918 there were at no time in any year more than 4 outbreaks reported for the whole Dominion; 37 cases of anthrax of domestic animals have been reported since 1920 in comparison with 24 human cases during the same period.

This rare incidence may be caused by a number of more or less intangible factors; on the other hand, it is possible that it is merely an apparent one, that is to say that one or more of the following factors may come into play: cases not seeking medical advice, cases whose diagnosis is missed, and properly diagnosed but unreported cases.

Once the possibility of cutaneous anthrax occurs to the mind the diagnosis is easy, but

this diagnosis is primarily a bacteriological one. Lucchesi[10] found that of 25 cases admitted under the provisional diagnosis of anthrax only 19 were bacteriologically positive; on the other hand anthrax is often mistaken for cellulitis or carbuncle.[18] A vaccine pock on an unusual site, streptococcic and pneumococcic infections of the skin, the hay bacillus,[4] bites of venomous insects[19] may simulate anthrax lesions, while conversely the primary anthrax lesions are not always typical. Eurich[4] observes:

> "We may find the eschar only without any vesicles, or the vesicles may be set some distance from the former; in other cases . . . bullæ may predominate, a relatively small eschar lying among them; or one or two bullæ may alone be present. In a fatal case of cutaneous anthrax of the wrist a white œdema replaced the red inflammatory area, and on it was one large flaccid bulla containing blood-stained serum. In another fatal case a similar white œdema disfigured a girl's chin and neck, but there was no vesicle or bulla, only a tiny black eschar, the size of a pin's head, on the point of the chin. In some instances the redness and inflammatory œdema may be almost absent, while in others it may involve a whole limb, or, extending over face, neck, and chest, give these parts gigantic proportions. . . . A spot not unlike a flea-bite in size, shape, and colour, crowned perhaps by a tiny vesicle or by a minute abrasion, may meet the disappointed view of the spectators of a demonstration; yet anthrax bacilli will have been found in the content of the vesicle or in the serum obtained from the denuded area after gentle scraping with a scalpel."

Sometimes a smear may be negative, and culture subsequently may prove to be positive,[19] but usually the bacillus is easily found, and can hardly be mistaken. It is the largest of all pathogenic micro-organisms 5 to 10 μ long (an erythrocyte has a mean diameter of 7.5 μ) Gram positive, forms "bamboo pole" like chains; it stains readily with methylene blue, and very often shows even with this method of staining distinct capsule formation. In view of the occurrence of anthrax like bacilli on the skin, all anthrax diagnoses should be confirmed by animal inoculation.[13]

TREATMENT

Modern treatment of anthrax can be shortly summarized under the following headings: strict abstinence from any local interference with the lesion, antianthrax serum, arsphenamines, and sulfonamides, alone or in combination, and immobilization of the affected area.

1. *Avoidance of local interference.* — Local interference is now definitely condemned by all authorities on anthrax; this includes thermocautery, chemical caustics, local injection of serum or disinfectants, excision, and especially incision. All authors agree that surgery breaks down the natural barriers, and is conducive to generalization of the process.[6, 7, 11, 15, 16, 17, 18]

2. *Serotherapy.*—Of the three main therapeutic agents employed in the treatment of anthrax today the administration of serum dates back the farthest. Anthrax is the first disease in animal and man which was shown, in Koch's fundamental paper (1877), to be caused by a micro-organism, and it also was the first disease against which a bacterial vaccine was found to be effective.[10] The origin of antianthrax serum can be traced to Toussaint in 1880 who suggested inoculation of animals with attenuated cultures as a protection against naturally acquired anthrax. In the same year Pasteur elaborated this method, and treated animals with antianthrax vaccine.

All authors warn unanimously against too little and too late. Regan[17] recommends doses of 50 to 100 c.c. according to the severity of the case. He administers this dose every eight hours for the first 24 hours, and adjusts further injections according to the progress of the disease. He starts with intravenous injections and after improvement has been achieved he administers the serum intramuscularly or subcutaneously. In case of anthrax septicæmia he advocates intravenous doses of 100 to 150 c.c. every three or four hours, to be continued until the septicæmia is checked. Smyth[19] in his report to the Industrial Hygiene Section of the American Public Health Association reviews an ample literature, and comes to the conclusion that "Antianthrax serum, in large doses intravenously and locally, repeated frequently until definite continuing improvement is evident, is the treatment of choice, with no meddlesome interference locally. . . ."

The mode of action of antianthrax serum is not clearly understood yet. Legge[9] quotes investigations regarding opsonins performed by Wright and Douglas; he comes to the conclusion that opsonins play a rôle in the serum's action. Antianthrax serum is not bactericidal *in vitro*,[14] it modifies the growth of anthrax colonies, but does not interfere with bacterial cell life[19]; Sclavo's or Mulford's serum does not exert any protective action for mice,[12] nor has anthrax immune serum any specific value in treating experimental anthrax infections in guinea pigs or rabbits.[8] Gold[7] reports 6 cases in which anthrax bacilli were found in the local lesions 6 to 31 days after the administration of 400 to 1,200 c.c. serum, at a time when the patients were clinically well on the road to recovery; in one of these cases the bacilli recovered from the lesion showed the same degree of virulence after successful serotherapy as the ones obtained before serum treatment had been commenced; course and rate of the development of the

anthrax carbuncle does not seem to be influenced by serum either. Gold obviates however Scherefettin's[19] thesis that antianthrax serum has no other specific action but stimulation of leucocytosis: no noteworthy leucocyte response to serotherapy occurred in Gold's cases, and in many patients improvement followed only after a sufficient amount of serum had been administered, and this without the exhibition of the usual signs of non-specific reactions to foreign proteins as fever and chills. South American workers claimed that normal beef serum is as effective in the treatment of anthrax as specific antianthrax serum, and reported on a series of patients effectively treated by the former agent.[17]

The disadvantages of serotherapy are the almost invariable occurrence of serum sickness and thermal reactions, and occasional complications such as urticaria, angioneurotic œdema and gastro-intestinal symptoms. It is quite expensive, and, at least in Western Canada at present, neither easily nor readily procurable.

3. *Organic arsenicals.*—Very shortly after the introduction of salvarsan (arsphenamine, arsenobenzol) in 1910—Ehrlich's "Therapia sterilisans magna"—this drug was suggested for the treatment of anthrax (Becker, 1911). Although arsphenamines have been in use for the treatment of anthrax for some thirty years, opinion regarding their value is still divided; in Europe they have been used extensively, and apparently with success.

Eurich[4] reports on a series of some 360 cases: he prefers salvarsan which he has used since 1911. He gives two moderately large doses, depending on age, sex, and constitution, generally one day apart; however, although he states that he has seen fever subside rapidly with a coincident general improvement under salvarsan treatment alone, he usually combines this therapy with the administration of serum. Gilbert[5] reports on 9 cases treated with arsenicals only: 8 with novarsenobenzene, 1 with sulfarsenobenzene. Two patients died, one of them apparently from an overdosage; most of his cases received a single injection of 0.6 gm., one case received two, and one three injections. Lucchesi and Gildersleeve[11] treated 15 patients with neoarsphenamine and serum combined, and 10 with neoarsphenamine only. The cases treated with neoarsphenamine exclusively received a total dose averaging 2.25 gm. per patient, ranging from 1.35 to 3.00 gm. in two to four injections; the initial dose is 0.6 gm., the next day 0.9 gm. are given, which dose is repeated, if necessary; a few cases got 0.45 gm. initial dose followed by 0.6 and 0.9 gm.

There was no fatality, however, these authors resort to serum in complicated cases. Pijper[14] used salvarsan alone in 40 consecutive cases without mortality; his dosage also is 0.6 to 0.9 gm. in two, sometimes three injections. Smyth[19] summarizes his report: "Organic arsenicals, intravenously, may be used as an adjuvant to serum or as the main resource if serum not available". Kurotchkin and Reimann[8] come to the conclusion that neosalvarsan is of no value in the treatment of anthrax infection in mice and rabbits, but is of distinct therapeutic value in guinea pigs; they conclude that it will be necessary to gather the statistics from many more cases treated with salvarsan to evaluate its effect in the treatment of human anthrax. Cruickshank[2] confirms their experimental work by observing that the effect of neoarsphenamine on the course of anthrax infection of mice is insignificant. Gold[7] treated 6 cases with neoarsphenamine and serum: a comparative analysis of the records of these cases revealed that neoarsphenamine had not shortened the course of the disease or materially added to the chances of recovery. At a later date he resorted again to neoarsphenamine in two serious cases "as a gesture of despair", but then again he did not think that this drug could have been credited with the patients' recovery.

4. *Sulfonamides.*

Cruickshank,[2] and concurrently May and Buck[12] published in 1939 papers concerning the treatment of experimental anthrax infection of mice with sulfonamides. Cruickshank found that M&B 693 (sulfapyridine), and to a lesser degree sulfanilamide has a beneficial action on the course of anthrax infection in mice; the action of these drugs in anthrax is not as spectacular as in streptococcal infections, and large doses of sulfonamides are required. May and Buck arrived at a practically identical conclusion: M&B 693, and to a less degree sulfanilamide delay death in mice infected with anthrax bacilli, however no ultimate decrease in mortality is found.

Gold[7] reports the largest series treated with sulfonamides; he has the best results. His series comprises 42 cases treated with sulfonamides, with excellent results in 38 cases. In one case sulfapyridine was discontinued too soon (14.0 gm. had been administered in 48 hours) and serum had been resorted to; in two cases the patient failed to respond to intensive sulfapyridine and sulfathiazole treatment respectively, in these cases also serum was given. One case was treated with sulfanilamide in large doses, 7.8 gm. daily for three days, 5.8 gm. daily for another six days; the patient recovered, but Gold is not convinced that sulfanilamide was responsible for the favourable outcome.

Judging by the speed with which œdema was controlled, Gold found sulfapyridine to be the most effective drug, next came sulfathiazole, and then sulfadiazine. However the greater efficacy of sulfapyridine was overcome by the greater incidence of reactions as nausea, vomiting and hæmaturia. He therefore considers sulfathiazole as the drug of choice, adopting the following routine:

"After the diagnosis of anthrax is made, large doses of sulfathiazole are given for two or three days, with frequent checking of the urine, the blood count and the concentration of the drug in the blood. If the œdema is not controlled by the third day, large doses of antianthrax serum are resorted to. If the spread of the œdema is checked by sulfathiazole, chemotherapy is continued until the œdema disappears."

He concludes his paper with the following statement ". . . sulfonamide compounds are a reliable and safe substitute for serum in the therapy of anthrax and should be given preference in the treatment of this disease. . . These chemotherapeutic agents are easy to administer: their use materially shortens the period of hospitalization and disability; and they are economical."

5. *Rest.*—As in any inflammatory condition, rest is an important adjunct in the therapy of anthrax.[14, 19] This is especially stressed by Eurich[4] who made the observation that of 11 patients with pustules on the wrist 7 died, while in a similar number with pustules on the forearm there was no fatality; the greater mobility of the former being the explanation. He recommends splints for affected extremities, and sandbags to immobilize head or neck. Scholl[18] treated 42 cases with lesions on face and neck with rest only, one case received serum in addition; he lost three cases, a mortality rate of 7%.

SUMMARY

There seems to be a marked discrepancy between the reported cases of anthrax in the neighbouring countries Canada and the United States; the ratio of incidence being: Canada: United States = 1: 6.3, after the necessary corrections for population. Part of the low incidence in Canada may perhaps be due to the fact that we are here less anthrax-conscious than the profession in the United States. It is therefore suggested that every atypical boil or similar cutaneous lesion should be bacteriologically examined by a smear, to exclude the possibility of anthrax. No final diagnosis of anthrax should be made, unless confirmed by culture, and possibly animal inoculation.

The local lesion should be strictly and most emphatically be left alone, local interference of any kind whatsoever is fraught with danger.

While sulfonamides give in the hands of the experienced excellent results, one seems to be well advised to use antianthrax serum in every case. Serum is still the sheet-anchor of anthrax therapy; it should be given in large doses, and as early as possible. Serum for veterinary use may be administered to the patient, if no serum for human use is available.

Should serum be not available the patient should be given large doses of sulfathiazole; one to three doses of 0.6 to 0.9 gm. neoarsphenamine may be used as an adjunct. The affected lesion should be immobilized by splints or other suitable devices. Control of the local œdema is the yardstick for all therapeutical procedures.

My sincerest acknowledgments go to Dr. M. R. Bow, Deputy Minister of Health of the Province of Alberta through whose active help penicillin and sera were supplied in the quickest possible way; to Dr. A. Somerville, Director of Communicable Diseases, to S./L. E. Cohen, R.C.A.F., then chairman of the local Penicillin Board at Edmonton, and to the Provincial Laboratory, University of Alberta, Director Dr. J. J. Ower, for performing the bacteriological examinations. The co-operation of the Commanding Officer No. 2 A.O.S., R.C.A.F., in having penicillin and serum flown directly to our hospital is herewith greatly appreciated.

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EXOMPHALOS

By S. S. Peikoff, M.D., F.R.C.S.(Edin.)

Winnipeg

EXOMPHALOS is a comparatively rare physiological umbilical hernia which is said to occur in the proportion of 1 to 6,000 births. It differs from true umbilical hernia in that it is not covered by skin, but has, instead, an extremely thin tissue-paper-like membrane composed of 2 layers, an outer, the amnion, and an inner, the peritoneum.

Different degrees of exomphalos have been described; ranging from a small knuckle of bowel in the base of the cord (which may inadvertently be tied off during delivery, and later leads to fecal fistula), up to complete absence of the abdominal walls. Some cases are associated with extroversion of the bladder.

Exomphalos is the result of incomplete intestinal rotation, the mechanism of which is described by Dott of Edinburgh. Briefly, the embryological sequence is this:

Up to the 4th week of fetal life, the intestinal tract is a more or less straight tube consisting of three parts (Fig. 2):

(*a*) *Foregut:* this includes the stomach up to duodenal papilla, is supplied by the cœliac artery, and is fixed to the posterior abdominal wall by a mesentery.

(*b*) *Hind gut:* which extends from left colic flexure to end of rectum, is also fixed to posterior abdominal wall. It is supplied by the interior mesenteric artery.

(*c*) *Mid gut:* This is the portion in which intestinal rotation chiefly takes place. It extends from the duodenal papilla to the left colic flexure, extending forward at right angles in a fanshaped loop, suspended from the posterior abdominal wall by a narrow base—the duodenocolic isthmus—and is supplied by superior mesenteric artery. The mobile midgut therefore swings forward between the fixed fore gut and hind gut.

About the 4th week of fetal life there is rapid increase in the size of liver and intestines. This forces the midgut out of the abdominal cavity into the cord thus producing the physiological hernia called exomphalos.

Ordinarily, this hernia is only of temporary duration. When the gut becomes more or less fully developed, it finds its way back into the abdominal cavity, a process which is aided by several mechanical factors: (1) The growth of the liver down and to the right, and the pull of the right umbilical vein. (2) The heavy cæcum. (3) The taut superior mesenteric artery acting as a guy rope. (4) The narrow duodeno-colic isthmus. These agencies force the intestine to rotate first 90°, and then a further 180° in an anti-clockwise direction, the end result being that the transverse colon comes to lie in front of the 3rd part of the duodenum and superior mesenteric artery and the cæcum which was originally on the left side, is now on the right (see Figs. 3 and 4). Fusion of various mesenteries and descent of the cæcum takes place still later.

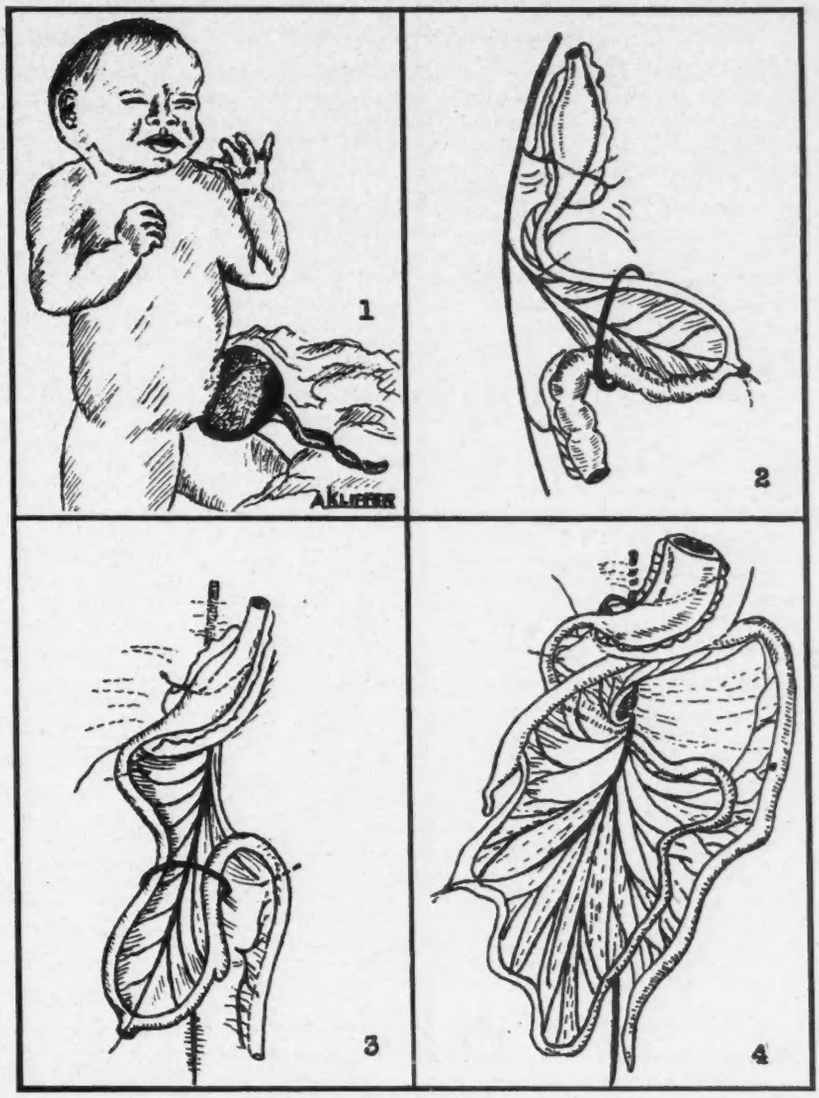

Fig. 1. (Exomphalos).—Note junction of skin and amnion. Note necrosis at apex of Sac. **Fig. 2.** (Intestinal rotation).—Before first stage (after N. M. Dott). **Fig. 3.** (Intestinal rotation).—Completion of first stage (anterior view); (after N. M. Dott). **Fig. 4.** (Intestinal rotation).—Second stage completed (after N. M. Dott).

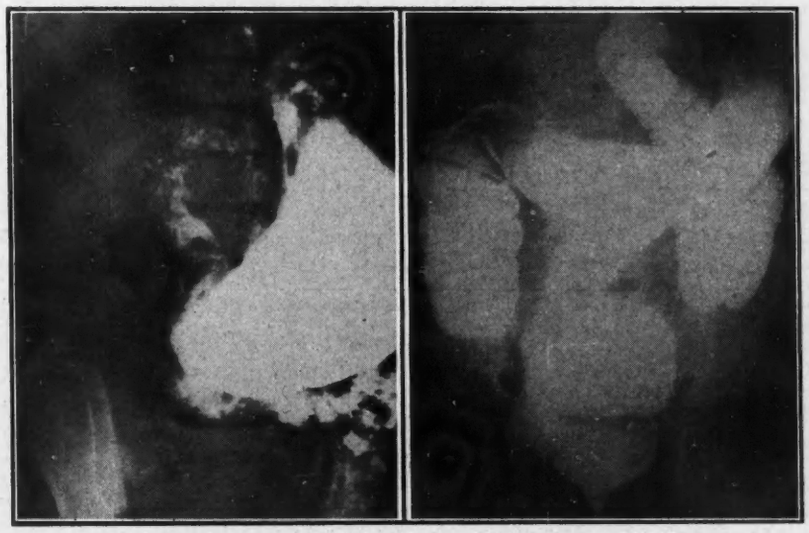

Fig. 5.—Stomach in normal position. Duodenum curves upwards and to the right. **Fig. 6.**—X-ray taken 2 years and 3 months after operation shows complete rotation of intestines has taken place.

The case presented here is one of exomphalos (Fig. 1). The intestines entered the umbilical cord, but did not return to the abdominal cavity, and did not undergo rotation.

CASE REPORT

The mother, a primipara, was confined by a midwife about 60 miles from Winnipeg on the morning of December 26, 1941. The child, a female, was conveyed to the St. Boniface Hospital by Captain Harvey Cohen, R.C.A.M.C., 7 hours later.

The baby appeared perfectly healthy in every respect, but presented, at the umbilicus, a mass about the size of a grape-fruit with about 8 inches of cord attached at the apex. The base of the hernia was about 2 inches in diameter. The skin stopped short about ¼ to ½ inch above the base, and from there on was continuous with the hernial sac which was so thin and transparent that one could easily see the liver, small and large bowel through it. In fact, it gave one the impression of a cellophane-wrapped basket of fruit. Near the attachment of the cord, the sac was beginning to assume a greyish-black necrotic appearance, and for this reason, an operation was immediately advocated.

The skin at the base of the sac was infiltrated with 1% novocaine, and along with very light ether anæsthesia, an incision was made close to the skin edge in order to preserve as much skin as possible.

The peritoneal cavity was entered here and with a finger in the abdominal cavity as a guide, the sac was trimmed downwards and to the left. At the lower border, care was taken not to overlook a persistent urachus or a patent hypogastric artery. At the upper border of the sac, large umbilical veins required careful ligation. At the apex of the sac, there was, fortunately, no persistent vitelline artery or Meckel's diverticulum, which, if present, complicate the operation considerably.

A difficult part in the surgical procedure was the separation of the sac, which was very adherent to the anterior surface of the liver. This resulted in considerable oozing. On referring to the literature, I subsequently learned that in difficult cases, it is not essential to dissect off the sac; it is enough merely to trim it along the edge of the liver and drop it into the abdomen, although this does not appear to be surgically sound.

The edge of the sac having been completely trimmed around, it remained now to replace the intestines within the abdomen. This is the most difficult part of the operation. Some authors advocate completing the rotation of the intestines as they are being replaced. I experienced so much difficulty doing so, that I felt I was fortunate in getting the intestines back into the abdomen in any fashion, leaving to luck and nature to complete the rotation. The fact that in this case, rotation as seen in a barium series 3 years later (Fig. 6) was completed, except for the duodenum, justified the procedure.

By jack-knifing the baby's body, the peritoneum and fascia were sutured with continuous chromic sutures, along with through-and-through silkworm gut sutures. The left rectus muscle was incompletely developed and formed a bulge in that area at the completion of the operation.

The child made an uneventful recovery and was discharged in 26 days.

Barium series done 3 years later is here presented showing complete rotation except for the duodenum, which curves upwards and to the right.

CONCLUSION

1. Since the sac undergoes necrosis early with impending peritonitis, operation should be performed at the earliest moment.

2. The mortality rate is only 21.4% if operation is done in 18 hours, as compared with 61.6% if surgery is done after 24 hours.[1]

3. A case of exomphalos to an extreme degree is here presented with favourable results.

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A SIMPLE TEST FOR ACETONE IN URINE*

By I. M. Rabinowitch, M.D., C.M., D.Sc., F.R.C.P.[C.], F.A.C.P.

Montreal

THERE are many uses for a simple test for acetone in urine. Diabetes is an example. Diabetic coma is often unsuspected, and the urine in this condition is very rarely free from acetone.[1] Yet, though the urine in suspected cases is almost invariably examined for sugar in general practice, in the writer's experience, the test for acetone is very uncommon, due to the reagents required.

All present procedures are modifications of the original sodium nitro-prusside test described by Legal[2] and which dates back to 1883. Legal first found that Weyl's reaction[3] for creatinine —a red colour produced by addition of sodium nitro-prusside to the solution, followed by sodium hydroxide—was also given by acetone. Le Nobel[4] elaborated the test by showing that the red colour produced by acetone is changed to magenta by acidifying the mixture with acetic acid. Bitto[5] preferred potassium hydroxide instead of sodium hydroxide. In testing for acetone in urine, Rothera[6] noted that creatinine, a normal constituent of urine, interfered with the reaction when a fixed alkali is used. He therefore, substituted ammonia for potassium hydroxide; but the sensitivity of the test was low; it was limited to a concentration of acetone of about 1 in 600. A modification of the test, however, increased its sensitivity. Rothera showed that addition of solid ammonium sulphate to urine containing acetone before the addition of sodium nitro-prusside and ammonia produces the same permanganate colour as by use of acetic acid and resulted in a much more sensitive test; acetone could be detected in as low a concentration as 1 in 20,000, and creatinine, a normal constituent of urine, does not interfere

* From the Department of Metabolism, the Montreal General Hospital, Montreal, Canada.

with the test. Other ammonium salts were not found as satisfactory as ammonium sulphate.

Hurtley[7] confirmed Legal's observation that the nitro-prusside reaction is a test for aceto-acetic acid as well as for acetone and found that Rothera's test is far more delicate for aceto-acetic acid than it is for acetone; it will detect the sodium salt of the former in a concentration of as little as 1 in 100,000 in two minutes and a concentration of 1 in 400,000 in five minutes. This, it should be noted, greatly enhances the value of this reaction clinically since, as Folin[8] showed, in diabetic urine, acetoacetic acid accounts, as a rule, for about 90% of the "total acetone".

The three tests in common use at present, based upon the above observations, are as follows:

1. To 5 c.c. of urine, acidified with glacial acetic acid, are added two to three crystals of sodium nitro-prusside. The mixture is well shaken and then overlaid with concentrated ammonium hydroxide. A distinct violet or purple* band at the junction of the two liquids indicates the presence of acetone.
2. To 5 c.c. of urine, saturated with solid ammonium sulphate, are added 2 or 3 drops of a freshly prepared 5% aqueous solution of sodium nitro-prusside, and to this mixture are added 1 to 2 c.c. of concentrated ammonium hydroxide. The colour reaction is the same as in the above test and is more distinct if, as in the above test, the ammonium hydroxide is added slowly so that it overlays the urine mixture.
3. One part of dried sodium nitro-prusside is ground to a fine powder and mixed thoroughly with 40 parts of dry ammonium sulphate. This dry mixture keeps indefinitely and thus overcomes the necessity of a freshly prepared solution of sodium nitro-prusside. About 2 c.c. of urine are saturated with this powder and this mixture is overlaid with concentrated ammonium hydroxide. The colour reaction is the same as with the other tests. Joslin regards this as the simplest and most reliable test.[11] Personally, I prefer the first test which has been part of the diabetic routine in this hospital during the last 25 years.

In all three tests, though the colour development may be noted within 2 to 3 minutes, no result is to be regarded as negative until one-half hour has been allowed for development of the permanganate colour. In all three tests, after maximum development, the colour gradually fades. In some urines, the permanganate colour may change to a muddy brown after a few minutes.

An attempt to simplify the test by using the same principles, but by adding the urine to a powdered mixture of the reagents has been successful. Ingram[12] was prompted to try this method, because of an accident. While doing one of the ordinary tests, a student had sucked some strong ammonia solution from a pipette into his mouth and was nearly asphyxiated from the vapour of the ammonia which reached his lungs. (Personal communication).

Ingram's mixture consists of 3 grams of sodium nitro-prusside, 100 grams of ammonium sulphate and 50 grams of anhydrous sodium carbonate. The powder is placed in a test-tube to a height of about one-half inch and is saturated with a small amount of urine. If acetone is present, a permanganate colour is noted within 2 minutes. As the author states, the test is thoroughly reliable and very sensitive; but, though the mixture is readily prepared in a chemical laboratory, it obviously has its limitations in office practice and, certainly, for use by patients, unless it is readily obtainable in a prepared state.

While working with similar mixtures, the writer noted that the proportion of sodium carbonate influenced the rate of development of the permanganate colour; the greater the proportion, the more rapid was the development, which fitted in with the observation by Rothera[6] that the presence of a high (OH) concentration caused the colour to appear rapidly, but it also faded rapidly. The proportion of ammonium sulphate is, however, also important, since upon it depends the exclusion of colour due to the normal content of creatinine in urine. Another phenomenon noted was that the temperature of the reacting mixture influences very appreciably the rate at which the colour develops. It, therefore, occurred to the writer that a very simple and rapid test might be devised by using such a mixture in tablet form and employing the heat of solution* of the sodium carbonate as a catalytic agent to hasten the colour development.

PRINCIPLE OF TEST

When a tablet, approximately 3/8ths of an inch in diameter, is placed at the bottom of an ordinary size test-tube, a small pocket of air is imprisoned between the lower surface of the tablet and the bottom of the tube. When such a tablet, containing a mixture as described above, is dropped into a test-tube containing urine, heat is immediately evolved due to solution of the sodium carbonate portion of the mixture. The temperature of the urine in contact with the

* The exact composition of the magenta-coloured compound is not known. Hawk and Bergeim[9] quote suggestions that it is probably a complex ion of ferro-penta cyanide with the isonitroso compound of the ketone or a similar ion with the iso nitroamine derivative of the ketone. The observations of Whitely[10] and the reaction in Hurtley's test[7]—use of hydrochloric acid, sodium nitrite, ammonia and a ferrous salt—suggest that the former is the most likely explanation.

* By heat of solution is meant the heat evolved or absorbed when a body (solid, liquid or a gas) is dissolved in a liquid, both being at the same temperature.

tablet is thus raised; but, whereas, the heat evolved from the upper surface of the tablet is rapidly conducted away by the urine, that evolved from the lower surface of the tablet is sufficiently imprisoned so that, if the urine contains acetone, the rate of the development of the permanganate colour is much more rapid on the bottom than on the top of the tablet. The permanganate colour, therefore, appears at the bottom sooner than it does at the top. In order, however, to obtain the desired heat to catalyze the reaction, so that the tablet would acquire the permanganate colour at the bottom and not at the top within one to three minutes, consideration had to be given to a number of conditions. Thus, whereas, sodium carbonate raises the temperature of water (and urine) ammonium sulphate lowers it. Consideration had to be given also to the effects of the amount of the binding agent in the tablet on the rate of colour-development. The sensitivity of the test decreases with increase of amount of binder used. Another variable was the degree of compression of the mixture. The more the tablet was compressed, the slower was the rate of solution of the sodium carbonate and, therefore, the rate of evolution of heat and thus the rate of the colour development.

After trial of different proportions of the reagents and the binder in the mixture, in order to obtain optimum evolution of heat and, at the same time, exclude colour due to creatinine, the composition of the mixture was as follows:

Sodium nitro-prusside	1.5	parts
Sodium carbonate (anhydrous)	28.5	"
Ammonium sulphate	45.0	"
Binder (lactose)	25.0	"

When a well-compressed tablet containing this mixture is added to a test-tube containing urine with acetone, a definite permanganate discoloration of the tablet occurs on the under surface of the tablet within 1 to 3 minutes, the intensity depending upon the amount of "acetone bodies" present, whereas, *the upper surface of the tablet remains white.**

Experience with over 1,000 urine examinations with this tablet has shown that the test is highly characteristic for "acetone bodies" in urine and that it is more sensitive than the above-mentioned three tests because of the contrast between white and violet, compared with violet and the different colours of urine. The test is thoroughly reliable. The tablet is also very stable. Even in loose powder form, in spite of the tendency for the sodium carbonate and ammonium sulphate to react with each other and thus liberate ammonia, this mixture has been found to be equally active after one year at room temperature when kept in a brown glass-stoppered bottle.

OFFICE TEST

Though the above test is very satisfactory for laboratories in which large numbers of examinations are made daily (40 to 50 tests may be performed in a few minutes), using the same principles, the tablet was modified so that the test is still more simple for office practice and for diabetics. Test-tubes are not necessary. One surface of the tablet has a depressed centre, in which the powder is not as densely packed as in the remainder of the tablet. In the depression, the powder, therefore, dissolves more rapidly than elsewhere and thus evolves heat more rapidly. The development of the permanganate colour is, therefore, confined to the centre of the tablet during the first 3 to 5 minutes of the reaction. The office test simply is as follows:

A drop of urine is placed in the depression of the tablet, with the aid of an eye-dropper. If the urine contains acetone bodies, the centre of the tablet will acquire the permanganate colour within 3 to 5 minutes, whereas, the remainder of the tablet will remain white.

Toxicity.—Accidental ingestion of parts of such tablets by patients from handling was considered, since "prusside" suggests a very powerful poison. The exact toxicity of sodium nitroprusside is not known. As far as I have been able to ascertain, however, no accidents have occurred with it in the past with the tests generally in use. In view also of the small amount of sodium nitro-prusside in the tablet (less than 5 mgm.), the fact that complex cyanides are not very toxic, and the probability that ferro compounds are still less toxic than the ferric compounds, this tablet, even if swallowed completely, is probably harmless. Accidental ingestion of part of the tablet from handling is definitely harmless.

* Though the mixture is slightly pink, due to the sodium nitro-prusside, the tablet is white due to the large proportion of the "binding" material.

I wish to acknowledge the co-operation of the Messrs. Frank W. Horner Limited in the preparation of the various tablets tested during this investigation.

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Medical Arts Bldg.

MÉNIÈRE'S DISEASE*

(With Some Observations on its Treatment by Histamine)

By Angus A. Campbell, M.D.

Toronto

IN 1861 Ménière made his classical description of a syndrome which still bears his name. Up until that time the disease had undoubtedly been seen and recognized but was confused with cerebral apoplexy. Ménière reported 11 clinical cases with post mortem findings on 1. He thought the disease was due to hæmorrhage into the labyrinth and although many of his interpretations were faulty he placed the lesion in the proper place and there it still remains. Barany later increased our knowledge of the labyrinth and further convinced otologists that the syndrome is caused by changes in the peripheral vestibulo-cochlear apparatus. Hallpike and Cairns have demonstrated that there is a dilatation of the labyrinthine tissues amounting to a hydrops. It seems certain that there cannot be a lesion in the acoustic nerve since the facial nerve is never involved, and since there are no accompanying neurological lesions the origin cannot be located in the medulla or pons. Brain tumours, no matter where they are situated, do not produce comparable symptoms.

One labyrinth will take over the functions of the other but until one of them is dead, or nearly so, the imbalance may produce violent disturbances in equilibrium. The disease may occur when both labyrinths are apparently dead. I have observed the syndrome in a deaf mute, neither of whose labyrinths gave any response to caloric or rotation stimulation.

The disease attacks both sexes about equally, is not often encountered in childhood, but is met with most frequently in the fifth and sixth decades of life.

The symptoms often appear in the form of a sudden, violent vertigo of the rotary type, nausea, vomiting and with more or less collapse of the patient. Nystagmus is usually present during the attack with the quick component to the good side. Deafness is always present at some stage, often being present in one ear for many years. Unilateral, variable tinnitus and a sense of fullness in the affected ear are common complaints. Consciousness is rarely lost and the patient has to endure this terrible storm often with a feeling of impending death. Labyrinthine tests during the attack are of doubtful value. They commonly show a sluggish labyrinth on one side or may be within normal limits.

The diagnosis should never be made on the history alone. A complete ear and neurological examination should be made. Chronic suppuration of the middle ear should be ruled out and it is well to remember that cholesteatoma may be present in a dry ear. The patency of the Eustachian tube should be determined and treated in all cases of obstruction but little reliance can be placed on this as a method of treatment. Fainting spells and epileptiform seizures are easily differentiated from Ménière's disease although hypertension and arteriosclerosis in older patients may be confusing. Focal infection, if present, should be eliminated on medical grounds but not with the idea of curing the patient.

A perfect or even satisfactory form of treatment has not been devised as yet. Pathological material is so scarce and so difficult to obtain that a completely satisfactory basis for treatment is hard to establish. Spontaneous recoveries are so common and controls so difficult to obtain that anything approaching finality is a long way in the future. Both medical and surgical treatments have been proposed but all with many drawbacks.

Medical treatment is the ideal to be aimed at, but in patients who respond poorly to this treatment or who for economic reasons must be actively employed, surgery must be resorted to,

* Read at the Seventy-fifth Annual Meeting of the Canadian Medical Association, Section of Otolaryngology, Toronto, Ont., May 25, 1944.

even if important tissues may be destroyed in so doing. Neuro-surgeons have invaded this field but only temporarily I hope. Dandy has been their chief exponent. By dividing approximately the anterior three-fourths of the auditory nerve the symptoms can be relieved, good hearing preserved and relief from tinnitus in about half of the patients. Dandy denies that the lesion is peripheral.

Little mention has been made lately of the pioneer work done by Lake and Milligan about forty years ago and reported in *The Lancet* of January, 1906. They simply opened into the external semicircular canal and labyrinth and destroyed some of their contents. This procedure was advised only in the case of a very deaf ear, since absolute deafness resulted from the operation. The dizziness was relieved in all cases. The most satisfactory case I have ever had was my first one. This patient, a man aged 32, had such severe vertigo for two years that he could not work. He had complete deafness in the affected ear. We operated on him, using Milligan's technique, thirty years ago and at present he is well and has never been dizzy since. Mollison and Wright have injected alcohol into the labyrinth and Day has used electrocoagulation with good results. Cawthorne has shown that by simply opening into the labyrinthine contents, much as Milligan had done, is sufficient to destroy the labyrinthine function and relieve the vertigo.

As our homœopathic confrères might say, *similia similibus curantur* (like cures like) so the medical treatment for Ménière's disease, has been, so far, largely of a homœopathic nature. If one has a vasomotor change in the labyrinth this can be altered and often relieved by creating a vasomotor change elsewhere, be it local or general. In the past leeches and fly blisters have been applied over the mastoid with seemingly good results and certainly benefiting the sense of fullness in the patient's head on that side. Saline purges were also resorted to, using the bowel as the medium for changing the water balance. Later Furstenberg designed a treatment to limit the sodium intake while using ammonium chloride and the kidney to alter the water balance. Talbot and Brown ignored sodium and gave large doses of potassium and with similar results. Sheldon and Horton and Miles Atkinson startled the world a few years ago by the results they obtained when using yet another and greater vaso-motor disturber, namely, histamine.

Three years ago, being impressed by their results, I abandoned the older methods for this newer and more fashionable form of treatment. During this time I have used histamine subcutaneously on 11 patients. From this small number only impressions can be formed. We found that all our patients gave a positive skin reaction to histamine but as Miles Atkinson has pointed out some reactions are more violent than others and show the pseudopods which he mentions. Almost all of our patients had had inflations, salt-free diets and ammonium chloride with indifferent results. We were greatly impressed by the immediate response to histamine. All but 2 patients got immediate benefit, 2 have had no attacks for 2 years; 3 for one year and 2 for 6 months while 4 others who had complete relief for from 4 to 6 months have had mild relapses. Our impressions have been favourable and we feel the treatment should be given further trial.

We have not used histamine intravenously but hope to do so in the cases which were failures with the subcutaneous method.

VENEREAL DISEASE — THE HIDDEN HAZARD IN INDUSTRY*

By L. P. Ereaux, M.D.

Montreal

THE two main venereal diseases, syphilis and gonorrhœa, can be found amongst industrial personnel and throughout all walks of life. Correctly diagnosed, venereal diseases can be eradicated by treatment; but too often, they are completely ignored and allowed to proceed merrily on their destructive ways.

Industry is affected by the venereally infected within its own ranks, but, by and large, industry has not searched for gonorrhœa and syphilis which are undermining its human foundations.

Overall epidemiological studies reveal that gonorrhœa occurs twice as frequently as does syphilis. Gonorrhœa is the more obvious of these diseases, and by irritation of the genital tract declares its presence soon after the infection is contracted: whereas syphilis may invade the

* For previous articles see *Canad. M. A. J.*, **51**: 439, 521, 1944 and **52**: 55, 136, 271, 386, and 500, 1945.

body and leave little or no evidence. Untreated syphilis, with its four-year dangerous infectious period is the greatest hazard to industry. Surveys made on industrial groups show a great variation in the prevalence of this persistently chronic disease.

Findings of positive Wassermanns run the gamut from the figure of 1% in the group employed in the Eastman Kodak Co. to 11.7% found positive in a large railroad organization investigated by Stokes.

In a survey in a transcontinental railway company, amongst 741 food handlers, recruited mostly from the coloured population, 12.82% showed positive Wassermanns. Amongst 210 sleeping and dining car stewards in the same company, 19.5% displayed positive reactions.

When Wassermann tests are taken at random on any average unselected industrial group, one can expect to find positive results in 3.5 to 4% of the workers tested.

Syphilis does not present a hazard of major epidemic proportions to industry, but it does give rise to trouble far in excess of the number of isolated cases which are scattered throughout the plant.

Syphilis is a contagious disease and is spread principally by contact of an infected person with a non-infected individual.

Contamination occurs following intimate personal contact and usually during sexual relations. The myth of the casual contact mode of infection must be dispelled in all considerations of the problem.

Casual contact giving rise to accidental infection is the exception rather than the rule, and the hazard of infection by the route of the toilet seat, towel, drinking glass or infected instrument exists, but accounts for less than 5% of cases.

An infected predatory male or a promiscuous female may infect groups within a company and thus become central foci of an epidemic. Here exists a problem of plant discipline if syphilis control is to be effective.

Dangers from this hidden hazard in industry do not arise so much from the acute infectious cases as from the old standing cases which develop physical impairments from their syphilis. These late complications affect mind, eye, heart and hand of the worker. Physical collapse on the job may jeopardize not only the worker's own life but the welfare and lives of the fellow workers and the public whom he serves. A syphilitic at the controls of plane or train, suffering from a sudden heart attack, stroke or mental crisis may carry not only himself but others to destruction.

THE HAZARDS OF SYPHILIS TO INDUSTRY AND THE PUBLIC

Sayers listed occupations in which syphilitic workers may endanger others:

Directly.—In the trades where personal contact and services with intermediate articles such as dishes, instruments, etc., may spread the infection: (A possible but not very probable mode of infection.) Bakers, beauty parlour operators, matrons, nurses, domestics, school teachers, hotel workers and food handlers.

Indirectly. — Involving job responsibility: traceable to the physical defects and complications in the workers arising from syphilis, and by impairing their efficiency rendering them incapable of carrying out their duties.

Transportation.—Pilots, in the air and on the water. Running trades; railroad engineers, bus, taxi drivers and chauffeurs. Crane and elevator operators.

Group leaders.—Directors, executives and labour leaders, whose decisions may affect the welfare of workers' financial and operational policy of their companies.

Infected workers in routine jobs, such as clerical workers or labourers, are relatively unimportant in the general welfare picture because of lack of job responsibility or of contact with others.

ATTITUDES

Today with social security and health schemes to the fore, the emphasis is placed on keeping the worker healthy, and on the job.

Industry's interest in the health of the workers sometimes does not go beyond the factor of his fitness to perform his duties.

Many companies are altruistic, as evidenced by the establishment of modern health services. Other elements of industry use medical services only as vigilantes to hurry workers back to the job after sickness or injury. A great number of otherwise efficient health services are not interested in the problem of syphilis.

Not all directorates have fostered health services in their companies and of those who have medical services, few have tackled the V.D. prob-

lem. Venereal disease is universally considered a government responsibility, and far removed from the realms of industry.

Government owned or subsidized companies can afford to be generous with health budgets, but hard-headed business men too can be shown the practical benefits arising from extension of health services into the field of V.D. control.

Recently much publicity has been given concerning the civilian and military aspects and the incidence of V.D. Alert governments and private health agencies have shown the way to attack the problem. Therefore industry cannot plead total ignorance of this present alarming trend.

Industry has a wonderful opportunity by adopting a realistic attitude for this venereal disease problem to help discover the hidden cases.

Industry because of its control of large groups is well adapted to further such a movement. Stokes has said that nowhere, save in the Armed Forces, can such an opportunity be found for mass control to carry on a successful V.D. campaign.

Organized labour unions, the workers and management must recognize the mutual benefit from periodical health examination. The worker must lose his suspicion of industrial health services as possible government appraisers of manpower for future wars. The objective of well organized health services is to conserve manpower and health. All parties must agree that a diagnosis of syphilis is not ground for rejection for employment or dismissal from service when discovered, and that such a diagnosis is not a blackmail lever for discharge from a job.

Industry realizes that once a syphilitic person is employed, difficulties are encountered if dismissal is contemplated, because unions fight for the rights of their members. Further, in dealing with any disease, when physical impairments prevent a worker from holding a job previously held and where rehabilitation to another job is possible, salary cuts are the inevitable result. When these measures are adopted much hard feeling results. Many industries refuse to employ known syphilitics because of these potential troubles. And some, still retaining a prudish attitude are inclined to dismiss from services any found with a positive Wassermann.

Beverage and food manufacturers are loath, with good reason, to employ persons known to be suffering from V.D. The public with its constant syphilophobia would boycott any products made under such conditions.

Until Health Boards require more than a cursory glance by lay personnel in the certification of food handlers, V.D. contaminated workers will continue to work unchecked and untreated. Some companies ignore the possibility of encountering syphilis in their employees and feel that what is not looked for does not exist. Unfortunately for them syphilis is ever present in industry and is a real, though unrecognized potential trouble-maker.

For such companies who do not look for syphilis, the word gets around to the syphilitic rejects of other companies whose policy is not to employ those with V.D. Then the syphilitic flotsam and jetsam from these sources are thrown up on the shores of these companies who thus mortgage their pension futures with these undiagnosed and untreated individuals.

In a competitive world where selection of efficient workers for available jobs is of paramount importance, industry has shown no desire to play the part of a big-hearted brother to absorb into employment the known syphilitic halt, maimed and blind.

By pre-employment examination, health services are primarily established to weed out the unfit. No company will deliberately take on its payroll potential medical hazards. Syphilitics too are notorious headaches to management. They tend to be untrustworthy and lack moral stability. They are unwelcome and unwanted by their fellow workers, because of the exaggerated fear of infection. If employed, persons with syphilis generally ask for special considerations in order to find time to take their treatment and this sometimes entails the disruption of time schedules and shift hours. Then too, time is frequently lost due to complications arising from treatment reactions.

The badgered syphilitic refused employment because of his illness seeks employment elsewhere. If continually refused legitimate employment he filters down into a reservoir of contaminated individuals who for means of livelihood must of necessity seek unsavory types of employment to exist. From this class will be regimented a criminal group.

COSTS

Syphilis is an expensive disease to maintain on the ledgers of industry. The costs to the worker, apart from the physical suffering and

domestic unhappiness, represent in untreated cases ten years off of his expected working life.

The complications of the disease interfere with his efficiency and may be responsible for physical harm from accidents which may follow on with his impairments.

Industry has to absorb the cost of syphilis and these costs are generally varied and covered up under other headings. Even though they are not apparent in financial statements they are nevertheless real. The illnesses from syphilis are generally politely diagnosed by the attending doctor under other conditions and disability claims are thus padded with time loss costs.

Syphilis may aggravate a pre-existing injury or an injury may precipitate a local outbreak of the disease in an infected individual. Compensation claims are paid for accidents, the direct cause of which was syphilis or in which syphilis contributed as a factor to the delayed recovery of the patient.

It is better by far to find and send the treatment to these people who are so infected, than to let their disease progress to the point where accidents to themselves and others may occur. Salvage campaigns in the material world have produced excellent results. If human salvage and rehabilitation should now be considered on as great a scale, a socially minded government might at this time aid in the eradication of V.D. by granting funds to industrial health services to co-operate in the fight.

The Army has enlisted cases of syphilis, has treated them so that they are not infectious to other persons and has found that these men follow through with their treatment and take their place as normal members of the Armed Forces. So industry by employing known syphilitics can aid public health in the great movement of stamping out V.D.

If management adopts a policy of co-operation with the syphilitic, it is not enough that a written policy over management's signature be considered adequate for a successful syphilis control program. Motives and objectives to be effective have first to be understood and agreed upon by all divisions of industry, and all must actively co-operate in their execution.

A SUGGESTED BLUE PRINT FOR THE CONTROL OF VENEREAL DISEASE IN INDUSTRY

COMPANY PROJECTS

1. *Formation of Industrial V.D. Control Committee*
   - (*a*) Committee to be composed of representatives from Capital management, Labour and Labour Unions, with Public Health and medical advisers, nurse and social worker.
   - (*b*) Committee functions: To adopt a realistic attitude; to understand and survey the V.D. conditions in industry and to teach and educate the workers about the dangers, modes of contraction and spread, the prevention, diagnosis and cure of V.D. Reducing facts concerning V.D. to simple terms by visual education; posters, movies and by talks.
2. *Health Service*

   Mass case uncovering:
   - (*a*) On the employed group, including executives, all tests to be repeated with yearly health examinations.
   - (*b*) On the pre-employment group— Blood Wassermanns on all applicants for employment.

   Medical investigation:
   - (*a*) Examination of employees as to: Stage of disease, its possible infectiousness.
   - (*b*) Appraisal of mental and physical fitness of infected individuals with reference to job responsibility, their re-allocation to work, suitable to mental and physical capacity.
3. *Co-operation with Public Health*
   - (*a*) Treatment clinics within industry or direction of infected cases to centres for treatment and consultation.
   - (*b*) Aid to Public Health in reporting cases, and possible sources of infection and contaminated contacts.
   - (*c*) Case holding and Company co-operation for workers' treatment time.

Dividends will accrue to all if industry will assume a greater rôle in syphilis control. By assuring employees suffering from syphilis the chance to work and to take treatment, these workers will in return give more efficient service, lose fewer hours from duty, increase production because of improved health and will cut down accident and pension losses.

Labour can by adoption of a realistic attitude help public health authorities to bring this hidden hazard out into the open and will aid materially in elimination of this saboteur.

"The discoveries of healing science must be the inheritance of all. That is clear. Disease must be attacked whether it occurs in the poorest or the richest man or woman, simply on the ground that it is the enemy; and it must be attacked just in the same way as the fire brigade will give its full assistance to the humble cottage as readily as it will give it to the most important mansion." (Winston Churchill).

1390 Sherbrooke St. W.

Case Reports

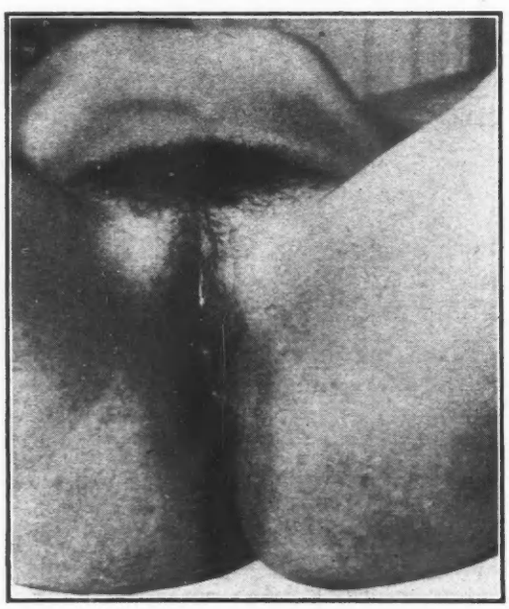
TRAUMATIC AVULSION OF PENIS AND SCROTUM

By B. H. Lyons, M.D.

Birch Hills, Sask.

The following is a report of a case of complete traumatic avulsion of penis and scrotum. As far as could be ascertained no other cases have been reported in the literature. The reported cases of traumatic amputation are incomplete, in that there was some normal urethra left. In this case there was none.

On October 11, 1942, a young farmer aged 27, was working around a combine at harvesting operations. The guard of the power-take-off had been removed for some reason. He stepped over this, and slipped. His trousers and penis were caught in the revolving shaft. The entire penis and scrotum were avulsed, and his clothing torn from his body. He was brought to the hospital



in a state of shock. After application of heat and administration of morphine and intravenous saline, he recovered from the shock. Examination of the wound disclosed the testicles to be present, but the scrotal covering and the penis with its attachments were completely gone, so that only a raw area of perineum remained.

He was given ether anæsthesia. The pudendal arteries were ligated to control hæmorrhage, and the testicles removed. The opening to the bladder was found only after probing, and was apparently at the level of the urogenital diaphragm. The wound was cleansed, sulfathiazole powder applied and a retention catheter inserted. The wound was sutured.

There was considerable infection in the wound, which improved with local treatment and sulfathiazole by mouth. He proved intolerant to sulfathiazole, which had to be discontinued.

On removing the catheter the passage would quickly close. An attempt was made to graft an epithelial-lined tract by tying Thiersch grafts around the catheter. Due to some drainage of urine around the catheter, the grafts did not take.

The catheter caused considerable irritation. After removal, it was necessary at frequent intervals to dilate the passage under anæsthesia. He had sphincter control, but the urine ran against his thighs, causing skin irritation.

In December he was referred to Dr. J. T. Priestley of the Mayo Clinic. Owing to the proximity of the external opening to the external sphincter, it was not thought wise to risk further plastic procedures, which might necessitate excision of some of the sphincter. A plastic procedure was carried out on the skin to form a pouch to assist him in directing the stream.

The patient has since that time used a bougie to dilate the passage and keep it open. He has to use it only occasionally now. He still complains of inability to control the direction of the stream.

Otherwise he has been in good health. He shows symptoms of endocrine deficiency, loss of strength, increase in weight, higher pitched voice, etc.

ŒSOPHAGO-GASTRIC CARCINOMA

By Wing Commander R. C. Laird, No. 1 T.C.

In presenting this case of carcinoma of the cardiac end of the stomach involving the lower part of œsophagus, it is not intended to give the impression that this was an unusual disease treated in any unusual manner. The interesting features were the two fortunate circumstances that the growth was operable, and that following radical operation the patient survived, and is at present very well. There are numerous such reports in the literature.

Fig. 1

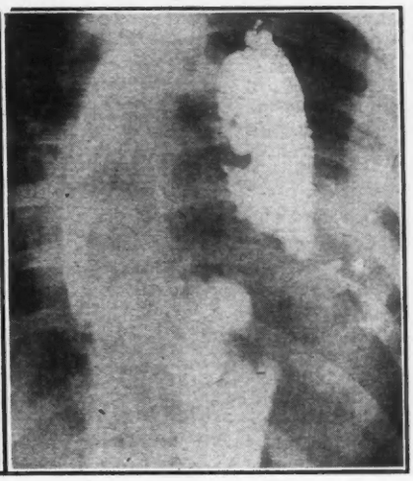


Fig. 2

Fig. 1.—X-ray showing defect at lower end of œsophagus.
Fig. 2.—X-ray outline of anastomosis and empyema cavity.

CASE REPORT

This young airman of 23 years of age was admitted to Christie Street Hospital in March, 1944, giving the following history. He was apparently well until about ten months before, when he noticed a burning sensation and a feeling of fullness deep to the lower third of his sternum after swallowing solid food. This continued for about four months, at the end of which he noticed the same sensations after swallowing fluids. This was followed by the appearance of tarry stools, and he then began to lose weight, amounting to about ten pounds in the three months before admission. He was still able to swallow fluids, and wet solids when first examined.

Examination on admission revealed a thin, pale young man who superficially showed no abnormalities. There were no palpable supraclavicular glands and the liver was not enlarged. His hæmoglobin was 42% and examination of the stools was positive for occult blood. X-rays of the upper gastro-intestinal tract with barium showed a filling defect in the lower third of the œsophagus, involving apparently about the distal one and a half inches of the œsophagus (Fig. 1). The extent of the stomach involvement was not readily demonstrated. By œsophagoscopic examination a friable bleeding mass was seen in the lower œsophagus and biopsy of this was diagnosed adenocarcinoma. A tentative diagnosis was then made of adenocarcinoma of the stomach involving the lower end of the œsophagus. Repeated transfusions were given until his hæmoglobin was 70%, and at that time operative treatment was considered to be indicated.

On March 23, 1944, the operation was undertaken. The patient was tilted slightly to the right. Anæsthesia was by intratracheal cyclopropane and ether. Through a left upper paramedian incision the abdomen was explored. There were no palpable secondaries in the liver or in the lymph glands. The tumour was palpable around the cardiac orifice of the stomach and extended to involve about the lower two inches of the œsophagus. It was freely movable below the diaphragm but was close to it. It was considered to be definitely removable.

The left paramedian incision was then extended upwards and obliquely laterally, and deepened to cut across the 7th and 8th costal cartilages and enter the sixth intercostal space. This was incised laterally to about the anterior axillary line, the pleural cavity being opened. The collapsed lung was lightly packed upward, and the diaphragm was then split from its anterior margin to its œsophageal hiatus. This freed the stomach and œsophagus which could then readily be mobilized. The lesser curvature of the stomach was then separated to a point well below the lower margin of the growth. The greater curvature was also separated from the gastrocolic omentum, taking care to preserve the vessels closely adjacent to the curvature. The stomach was cut across obliquely well below the tumour, leaving a long projection of greater curvature with intact blood supply (Fig. 3). The cut lower margin of stomach was sutured, leaving only the upper end of the greater curvature, which was cut across straight to facilitate anastomosis with the œsophagus. The mucosa of this upper end of stomach was then cut back a distance of about three-quarters of an inch, leaving a cuff of muscle and serosa on the stomach. The œsophagus was freed well up toward the point where it disappeared behind the bifurcating trachea, and the stomach brought up into the chest. The muscular cuff of the upper end of stomach was sutured to the posterior wall of the œsophagus, which was then cut across above the growth and sutured to the mucosa. The cuff was closed anteriorly around the œsophagus to complete the anastomosis. A duodenal tube was passed across the anastomosis. The stomach was then sutured to the lateral pulmonary ligament to eliminate as well as possible the downward drag on the suture line. Further support was provided by suturing the diaphragm around the stomach in the process of closing the incisions. The pleural cavity was drained by a stab closed intercostal drainage, and the incisions sutured in layers.

The postoperative course was marked by high and continuous fever for about two weeks. The patient was given nothing by mouth for four days but vomited the duodenal tube on the second day. Intravenous sulfathiazole was administered regularly for two weeks, then discontinued and penicillin was given intramuscularly, 20,000 units every four hours. About the 18th day, purulent fluid was aspirated from the left pleural cavity with a positive culture of non-hæmolytic streptococcus.

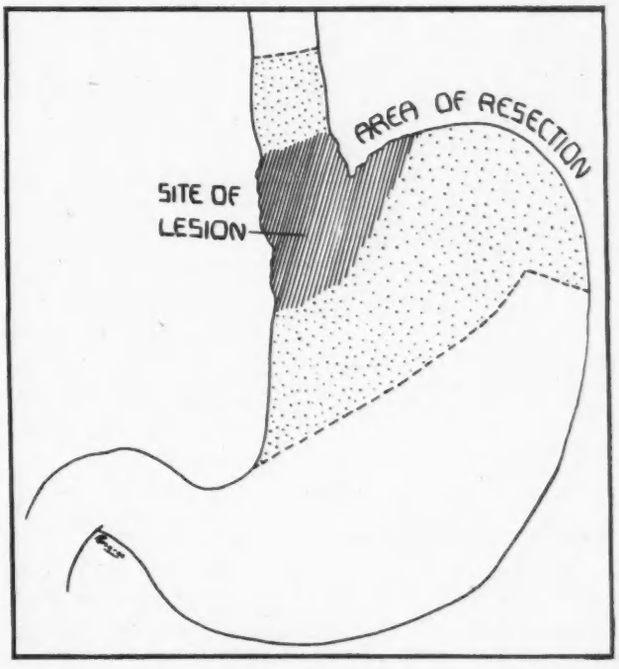


Fig. 3.—Area of resection of stomach and œsophagus.

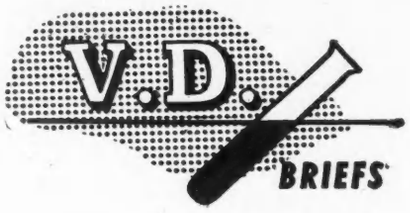
Penicillin was injected into this pleural fluid, 50,000 units in solution, and this aspiration and injection was repeated every second day for 18 days. The patient's temperature became normal about four days after the first aspiration and remained so. The intramuscular penicillin was discontinued after a week. Although the number of colonies of organisms in the pleural fluid cultures markedly decreased, they never completely disappeared and the fluid continued to collect.

Accordingly, on May 1, or just five weeks after operation, a rib-resection was performed, and the empyema cavity thoroughly drained. Shortly after this the cavity was outlined with lipiodol at the same time as the anastomosis was demonstrated by barium, and no close relationship was seen (Fig. 2). Ten days after the rib-resection the patient was out of bed, and taking soft diet without difficulty. During the next month there were two brief periods of malaise and fever which were unexplained and which rapidly subsided, and two months after the rib resection the empyema cavity had disappeared and the tube removed. In the meantime the patient had progressed to full diet, with a preference for small meals frequently and had begun to put on weight. General strength gradually returned, and for the month just before his repatriation he was practically normal in all respects. He returned to England about August 15, just short of five months after the operation.

In a brief discussion of this very interesting case there are one or two points I would like to mention. This patient was a young man of twenty-three years, who had lost only about 10 lb. in weight, and was not debilitated seriously. Fortunately, the growth was early enough to be removable, and we were not seriously menaced by leakage at the suture line. This is the greatest danger in this operation, and we were fortunate to avoid this. It is possible that the cuff of stomach sutured around the œsophagus, and the relief of tension by suturing the stomach to the lateral pulmonary ligament and the diaphragm, were in part responsible for this good fortune. I also believe that the use of sulfathiazole and of penicillin was definitely helpful.

It has been the invariable rule that England, so steadfast in war, so indomitable in peril, should at the moment when the dire pressures are relaxed and victory has been won cast away its fruits. Having made every sacrifice, having performed prodigies of strength and valour, our countrymen under every franchise or party have always fallen on the ground in weakness or futility when a very little more perseverance would have made them supreme, or at least secure. Now, after Ryswick as at Utrecht, as at Paris in 1763, as after the Napoleonic wars and Waterloo, and as after Armageddon, the island mainspring of the peace of Europe broke, and England amid a babel of voices dissolved in faction, disbanded her armies and sought to repay the spites and hardships of wartime upon the men who had carried us through.—Winston Churchill in "Marlborough".

Venereal Disease Campaign



Babies Saved from Syphilis

Syphilis extends to the fetus about the fifth month of pregnancy. Prior to that, spirochætal invasion of the fetus has not occurred in most cases. If maternal syphilis is discovered before the fifth month—invasion of the fetus can be checked. If treatment is continued till term, the baby has a 95% chance of being normal and non-syphilitic.

"Blood Tests for Every Expectant Mother Before the Fifth Month"

Medical "Certificates" for Prostitutes

From a committee report, House of Delegates, American Medical Association, June 8, 1942.

"It is inconceivable that any reputable physician should so degrade his profession and himself as to issue certificates to prostitutes to the effect that they are free from venereal disease."

Gonorrhœal Vaginitis of Immature Girls

"In most instances, vaginitis of immature girls is not due to gonorrhœal infection. An accurate diagnosis depends on securing positive cultures from discharge which is best obtained from the neighbourhood of the cervix. A diagnosis which depends on an examination of spreads is not to be relied upon. *Too many other Gram-negative organisms in the vaginæ of children resemble gonococci.* Ordinarily a gonorrhœal infection is limited to the vaginal mucosa. Salpingitis occurs very rarely.

Girls with gonorrhœal infections need be kept from school only while the discharge is profuse. If properly treated, this period should be a matter of only a few days. *The spread of infections on toilet seats is not to be feared.* The danger of institutional contacts has been grossly exaggerated. Ordinary isolation technique in well conducted hospitals is sufficient to prevent the transmission of infection to other patients. More intimate direct contacts in the family or with playmates constitute the most frequent modes of spread of the disease in immature girls."—*Venereal Disease Information,* May, 1943.

"Find V.D. Contacts—Report V.D. Cases"

Clinical and Laboratory Notes

A SELF-STABILIZING TRIPLE GRIP BASE FOR CRUTCHES*

By Major Arthur M. Vineberg, R.C.A.M.C. and Mr. Henry B. Bowen

Montreal

In January, 1945, one of us (A.M.V.) watched a legless returned soldier while walking on crutches, slip and fall into a snow bank. The incident was annoying and seemed unnecessary in this modern technical age. It was decided at that moment that something should be done to improve the present day crutch.

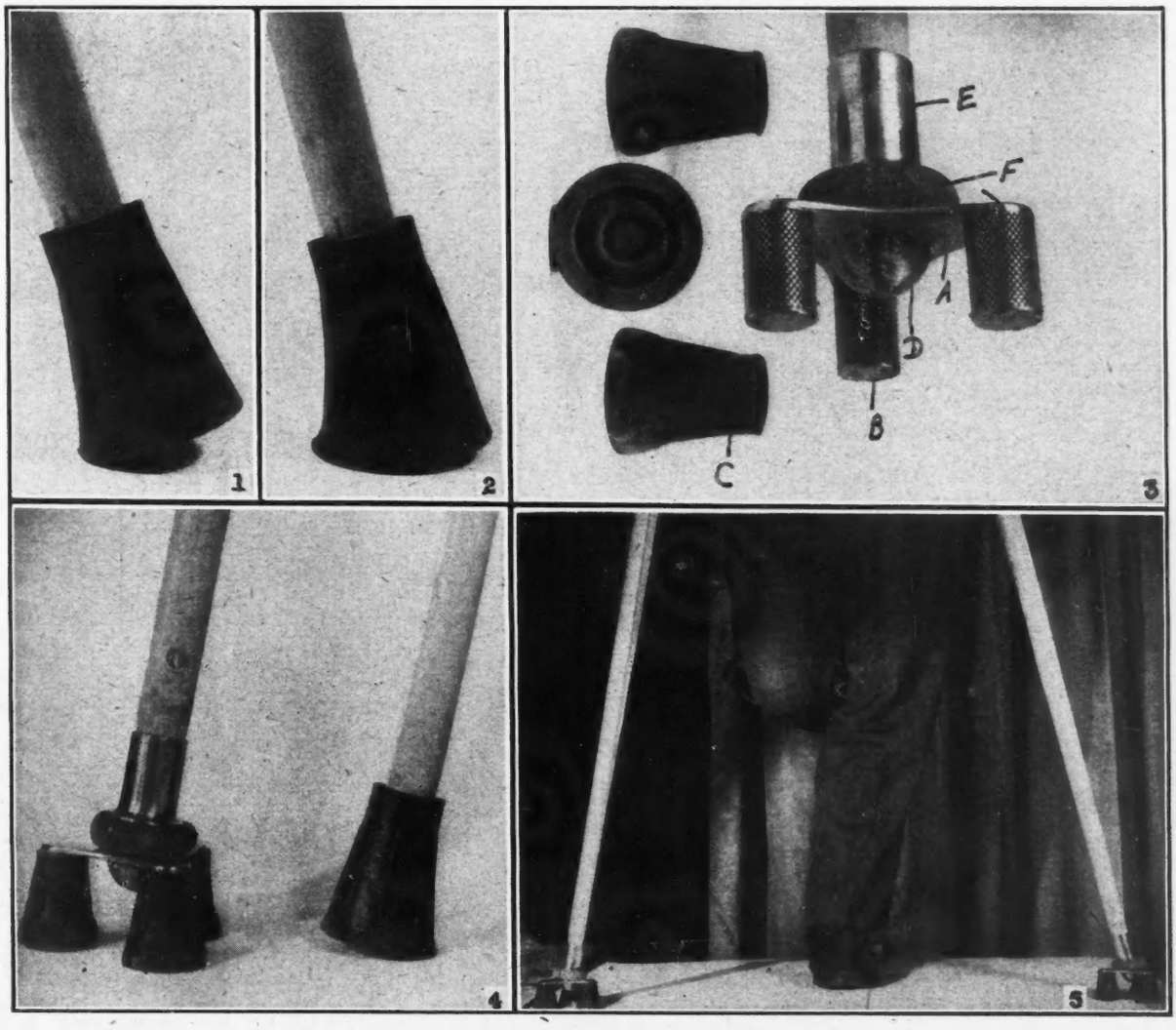
A search of the literature revealed very few publications on the crutch: there is no written record concerning its history.

Epstein,[1] in a most interesting article traced the development of the crutch through a study of ancient carvings and paintings. He pointed out that the Hebrew word for crutch is *misch-eness*, whereas the word for "support" is *smuchos* indicating that the ancients knew of the crutch but failed to leave any written description in their literature. Epstein reproduced a picture of "the earliest known record of a crutch, a carving executed in 2,830 B.C. on the entrance portal of Hirekouf's tomb".

This author states that for four thousand years the single stick with the axilla transverse bar was the only crutch depicted. About the year 1800 the introduction of the saw made it possible to split the staff into two halves permitting the insertion of a cross piece for the hand. Since that time improvements have been made for adjusting the length of the crutch, Lewin.[2] There have also been various improvements in the type of crutch tips, the more recent crutch tips being made of rubber. At present in this country the latest type of crutch tip in use is the Vimy rubber suction tip.

A study of the Vimy suction tip discloses two obvious defects.

* The working model was made entirely by one of us (H.B.B.). This crutch tip was developed on the Surgical Service of Major Vineberg at Montreal Military Hospital at Ste. Anne de Bellevue, P.Q.



1. *Angle of contact between crutch and ground.*—In walking, the crutch is never at a right angle to the ground, it is usually at an angle of about 80° whether it be in the front, behind or at the side (see Fig. 1). The first point of contact with the ground is that part of the suction tip rim nearest the user and represents less than one-third of the circumference of the rim tip. The entire surface of the suction tip comes into contact with the ground only after the full weight is applied (Fig. 2). The rubber tip in order to make complete contact with the ground must then bend through 10° to compensate for the angle at which the crutch is held off of a right angle.

2. *Pin-point surface.*—The surface area of the present-day crutch tip is extremely small as compared with that of a pair of feet. This difference alone results in instability. The crutch tip about to be described is designed to (1) adjust for the angle of contact between the crutch and the ground so that the crutch tip is at right angles to the ground; (2) increase the weight-bearing area.

NEW CRUTCH TIP

Tripod assembly (Fig. 3).—This consists of an aluminum plate (*a*) shaped as an equilateral triangle, which carries three hollow aluminum posts; (*b*) these posts are placed under the surface of the plate at the apex of the triangle. The distance between two posts is 3″, thus the clearance distance at any one point is 1½″. Small rubber suction cane tips (*c*) fit on to each post. On the upper surface of the plate there is a depression or socket (*d*), into which the ball fits.

Ball and shaft.—These consist of a round metal ball connected to a hollow shaft (*e*); the ball fits into the socket of the aluminum plate where it is held by a steel collar. The hollow steel shaft is attached so as to take the end of the wooden crutch which can be snugly fitted into it. A rubber washer (*f*) is placed between the plate and the shaft. This washer carries no weight.

The advantages of the new self-stabilizing triple grip base for crutches is self-evident. It automatically adjusts itself so that no matter how the crutch is placed the three suction cups are at right angles to the ground (see Figs. 4 and 5), and it provides a larger weight-bearing surface. This surface is stable and cannot tip because of a lowered centre of gravity.

It has been tried out over icy lanes and roads by men who have been on crutches for many months. They state that their confidence in walking is greatly increased particularly on uneven ground, slopes and slippery surfaces.

We wish to thank Canadian Army Photos M.D. 4, for the photographs, also the Occupational Therapy Department at Ste. Anne de Bellevue for their co-operation.

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Editorials

THE END OF THE EUROPEAN WAR

THE war in Europe has been brought to an end. Our Association, as a representative body, cannot let the occasion pass by without recording its sense of relief at the cessation of the struggle, as well as its equally deep sense of thankfulness for deliverance from such national peril. The contrast between the spring of 1940 and of this year is indeed one between the darkest shadow and blessed light.

There is now before us the task of rehabilitating those medical men who will return from military service. There are also medico-economic problems to be faced and their far-reaching implications. These things we can turn to with freedom from the distraction and strain of continual destruction and waste. The last five and a half years have shown with what steadfastness the profession has devoted itself to the duty of the occasion, and the demands of coming changes will be met in the same spirit. But our Association has all the greater need of sustained support from the members of the profession in Canada.

A NEW CHILDREN'S HOSPITAL IN TORONTO

IT is a far cry since Canada's first hospital, St Jean de Dieu, was established in Acadia, the home of Evangeline, in 1629. Many hundreds of hospitals have since been built throughout the land, all of which have contributed greatly to the health and welfare of the nation. Of necessity, civilian hospital construction has been greatly curtailed during the past six years, thus creating a backlog of much needed hospital accommodation. Recent surveys conducted in widely separated parts of the Dominion have disclosed that in some parts the need is acute and pressing. No doubt this need will be met just as rapidly as time, materials and money will permit.

Our attention has been called to a hospital building program in Toronto which we think is bound to be a great success. The Hospital for Sick Children, founded more than

70 years ago by Mrs. Samuel F. McMaster, who set up six iron cribs in a house on Avenue Road, has long since outgrown its present quarters on College Street, a building which no doubt was regarded in its day as a thing of beauty and a joy to work in. It is no longer a thing of beauty and the joy of the staff in working in such crowded and sadly inadequate space derives from the magnificent service which is rendered to thousands of little children.

The old building may be obsolete but it can point to a proud record. Its history is coincident with the greatest strides made by scientific medicine. Going back just 20 odd years, we find a comparative picture which is thrilling in its life-saving dividends. Let us look at the hospital case records for four diseases:

Disease	*Number of cases*	*Mortality rate per 100 admissions*
Acute diarrhœa	1921—410	8.5
Acute intestinal infection with toxic symptoms	1921—156	48.0
Marasmus (badly undernourished infant)	1921—203	50.2
Rickets	1925—154	
	923	
Acute diarrhœa	1942— 25	0
Acute intestinal infection with toxic symptoms	1942— 72	5.5
Marasmus (badly undernourished infant)	1942— 13	0
Rickets	1935— 4	
	114	

A reduction of 809 cases in four diseases and a saving of hundreds of precious lives!

In the fields of research, surgery, preventive medicine, nutrition and education, this grand old institution has done its full share in an area extending well beyond the city of Toronto, indeed extending throughout Canada.

In 1922, 15% of all cases of acute appendicitis admitted to the Hospital died. For the five year period, 1940 to 1944, the Hospital admitted 2,266 cases of appendicitis with only 10 deaths—a mortality of 0.44%.

Due mainly to the work and record of the Hospital in dealing with milk and waterborne diseases, Ontario in 1938 adopted compulsory pasteurization of milk, a measure without parallel for such a large area in any part of the world.

In 1937, Ontario was visited by one of the worst polio epidemics in its history. The Hospital staff, working day and night, produced 32 Iron Lungs and more than 3,000 splints which did so much to save lives and prevent deformities.

Burns are among the common accidents seen in the Hospital and bad burns used to snuff out 18 of every 100 children treated. Today, mortality from burns is not more than 3 per 100.

Defective hearing and cross-eyes, two frightful handicaps for children, have yielded up much of their terror to the skill of the surgeons.

Infant feeding practised and taught with fidelity and comprehension stands out as one of the glorious chapters of the organization. Much more could be written about this fine institution and its mission of healing and hope to many thousands of children.

Unfortunately, the present buildings are totally inadequate. There is a constant waiting list of approximately 200 children who have to bide their time for admission to the hospital; and so the time has arrived for the building of a new Hospital for Sick Children in Toronto. A campaign will shortly be launched to collect $6,000,000—a considerable sum of money—but none too much to meet the needs and none too much for the great-hearted friends of little children to raise. Save the children and save the race!

The *Journal* whole-heartedly wishes this building program the completely successful issue which it merits.

HEALTH SERVICES IN MANITOBA

ONE of the main features of proposed legislation regarding health services should be the effort to provide amply for its preliminary examination. It will be recalled that a special Parliamentary committee was set up to deal with the suggested Federal Health Insurance Bill, and opportunity was given for all interested groups to appear before it and to put forward their views. The Government of the Province of Manitoba is following this

method in utilizing the radio to announce its proposals for extension of health services in that Province, making it clear that it desires constructive criticism of these proposals by all interested bodies.

We are publishing the outline of these health proposals as broadcast by the Hon. Ivan Schultz, Minister of Health and Public Welfare of Manitoba, last January [see Section of Medical Economics, this issue]. This broadcast was prefaced by some remarks by the Provincial Premier, Mr. S. S. Garson, in which he dealt first with the financial difficulties in connection with the Manitoba health plan. Mr. Garson admitted that the plan would cost much money, and he hoped that the Dominion Government would contribute a good deal of this. But as things are he could not say how much help might be expected. The whole future of Federal grants to the Provinces is uncertain.

In spite of this, however, it has been felt that the planning should be started. The bringing together of medical and nursing personnel, of diagnostic and other technical equipment, and of administrative personnel takes time, and the importance of having them available in order to implement the proposals cannot be stressed too greatly.

There are what Mr. Garson calls "two indispensable ingredients" in the working out of this plan: (1) an informed public opinion; (2) active public support and cooperation. He insists that it is not the intention of those planning these services to thrust them on to the population of the Province. Suggestions will be listened to, and where possible will be worked in.

Perhaps the main feature of the plan is that it is left to the local areas to decide whether or not they wish to come in under the provisions of the plan.

The Government has taken as its chief concern the provision of adequate full-time health services for rural areas, together with reasonably good diagnostic facilities in all rural hospitals. The question of medical care is left exactly as it is at present, that is, an arrangement between the medical profession (or members thereof) and the local communities who wish to provide medical services on a general practitioner basis for their people on a prepayment plan. When a community has taken advantage of the provision of local health services and diagnostic facilities, then and then only will the Government contribute to the cost of providing general practitioner service on a pre-payment plan.

To meet the criticism that the estimated cost of the service is too low ($1.00 per person per year) it is pointed out that there will be certain additional sources of income. These include: (*a*) a service charge for each x-ray plate; (*b*) charges on a fee basis to those not entitled to receive services under the plan; (*c*) payment for diagnostic work by the Workmen's Compensation Board when it is their responsibility.

We commend these proposals to the study of our members, as a serious effort to contribute to the solution of a pressing economic problem.

Editorial Comments

Sir Thomas Lewis

The death of Sir Thomas Lewis removes not only an international scientist of the highest renown, but one who has had a peculiarly wide influence on medicine in Canada and the United States. It is fitting that our tribute in this issue should come from one of those whose association with Sir Thomas was as close as was that of Dr. Meakins. We believe that another well known associate in Sir Thomas' work, Dr. Paul White, is to pay his homage in a forthcoming number of the *American Heart Journal.*

The life of Sir Thomas provides rich material for contemplation. His work on the heart alone set him in the forefront, but if ever there was a mind which confined itself to a branch of research without becoming narrowed by specialization it was his. It was not only that he had the gift of being able to carry out research, which is rare enough, but he had it in rare degree. His *Blood Vessels of the Human Skin and Their Responses* is probably one of the finest examples of first class research the technique of which could be carried out anywhere, and by any first year medical student. But with all its simplicity of technique the book soon reveals a closeness of writing which is of itself a proof of the author's powers of reasoning; it does not make for ease of reading, but apparently he was never one to worry over making research an easy affair.

Before long we hope that a complete bibliography of his extensive writings on the circulatory system will be prepared by someone who will assess or at least indicate the debt which medicine owes to Sir Thomas. Probably his most notable book was his *Mechanism of the Heart*

Beat. He wrote this at the same early age as that at which Vesalius produced his *De Fabrica,* but it was only the beginning of work which was still being carried on to the last hours of his life. He had had four cardiac attacks in his last 18 years, and knew well what to expect. "Another arrow from the same quiver" he said to a friend (Sir Henry Dale) on the occasion of the second attack, "but there are plenty more to come and one of them will get me in the end".

Medical Economics

MANITOBA OUTLINES A HEALTH PLAN

Comprehensive health proposals have been publicized by the Hon. Ivan Schultz, K.C., Minister of Health and Public Welfare for the Province of Manitoba. In outlining this plan to increase and improve health facilities, Mr. Schultz has stated that it is a *proposed* plan: that constructive criticism and helpful advice will be welcome. Perhaps the main feature of the proposal is that it is left to the local districts to decide whether they wish to accept the provisions of the plan. Thus the plan calls for a local decision but gives financial backing from the provincial coffers. The plan may be analyzed in terms of its four divisions: preventive medicine; diagnostic services; curative services; hospital facilities.

(*a*) *Preventive medicine.* — "In order to direct and supervise preventive service, to ensure effective administration and to provide uniform standards such services should be under provincial control, but operational costs should be shared with the municipalities." To facilitate this preventive service health units would be established throughout rural Manitoba. Each health unit would be under the direction of a Medical Director whose task it would be to enforce the provisions of the Public Health Act. He would carry on a full immunization program; venereal disease and tuberculosis control would be his responsibility; sanitation, school medical inspections, maternal and child welfare would come under his direction. In this work he would be assisted by a staff of public health nurses, a sanitary inspector and adequate clerical staff.

It has been estimated that the cost of this service would be at the rate of $1.00 per person per year. The suggested division of this cost is that 2/3 be assumed by the province and 1/3 by the municipality.

(*b*) *Diagnostic service and facilities.* — A standard type of diagnostic equipment, including x-ray and a properly equipped laboratory, would be compulsory for all hospitals, both rural and urban, and such service would be rendered the patient, on authorization of a medical practitioner, free of charge. The Provincial government would assume the capital cost for the equipment throughout the Province.

Operational costs in rural areas are estimated at 50c per person per year, with the suggested division of this estimate being (approximately) 2/3 to be carried by the Province and 1/3 by the municipality.

(*c*) *Curative medicine.*—The government proposals leave the question of the provision of general practitioner service to the individual municipalities, stating only that in their opinion the cost of illness should be provided in advance, that a municipal tax would best meet this cost and that the method of payment for the provision of such service should be a matter of arrangement between the municipality and the medical practitioner.

The Provincial government undertakes to assist a municipality in the provision of this general practitioner service if the municipality enters "fully and co-operatively into the Provincial plan regarding health units and diagnostic services". In making assistance in curative services conditional upon acceptance of the health unit and diagnostic service, the Manitoba government has declared the effective prevention of disease to be its major concern.

The estimated maximum cost of this medical service has been set at $3.00 per person per year. The Provincial contribution would be 1/6 of the cost of the service, providing the cost did not exceed the estimated maximum of $3.00, the remaining 5/6 would be met by the municipality. In unorganized territory the Provincial share would be increased to ½ the cost of the service.

In connection with this section of the proposed plan, tribute was paid to the efforts that have been made to provide medical care for the people of the Province. "Considerable experience has been gained in the provision of general practitioner service to rural Manitoba in the establishment of municipal doctor areas in the various parts of the Province. We are glad to note, too, that in the City of Winnipeg, a very forward-looking step has been taken by the medical profession itself through the Manitoba Medical Service which provides for payment of the cost of illness in advance."

(*d*) *Hospital facilities.*—It is suggested that the Province be divided into hospital areas and that adequate hospital buildings, beds and equipment be made available in each such district. "A hospital council, advisory to the Minister, should be responsible for the setting up of such areas for supervision of hospitals including definite standards of building, equipment, accounting and service. Other than the provision of diagnostic equipment by the Province the capital cost of building and equipping hospitals should be borne by the local area; where a hospital is built or operated as a municipal institution, the

immediate municipality where the hospital is located should pay a higher percentage of capital and operation costs than the rest of the area.''

In his broadcast on January 10 outlining these health proposals, Mr. Schultz stated that the Government's one purpose was the provision of the best health services possible for the people of Manitoba. The plan, as presented, was designed to allow for expansion and for its introduction in gradual stages. ''The plan is basically a democratic one; it regiments neither the public nor the profession; it allows the people of each municipality to decide for themselves the type of medical care they desire and the method of payment for the same; it leaves the members of the medical profession free to make whatever arrangements with local communities they see fit.'' Another feature of the plan is that it would link up with a national health insurance scheme, should such be introduced.

In conclusion Mr. Schultz emphasized the fact that an informed and health conscious public, and active public and professional support and co-operation were necessary to the successful implementation of these Manitoba health proposals.

Men and Books

MONTAIGNE AND HIS MALADY

By F. Arnold Clarkson, M.B.

Toronto

A study of the men whose names are written in Valhalla shows that there was, in point of time, a very uneven distribution. After a long silence in Europe, the sixteenth century awakened to the songs of poets and the prose fancies of vigorous writers. England became a ''nest of singing birds'' and France was to savour the keen wisdom of three men, Rabelais, Calvin and the subject of this paper.

Michel Eyquem was born near Bordeaux on February 8, 1533. After the death of his two brothers and his father, he abandoned in 1571 the paternal name of Eyquem, and, adopting that of his estate, he goes down the ages as Montaigne. In the same year Queen Elizabeth was born, and outlived him by ten years; and Catharine de Medici, of infamous memory, was married to Henry the Second. Calvin, one of the great minds of the period, broke away from the old faith in 1534. Loyola formed the Society of Jesus in 1539, and Luther had thrown his inkbottle at the devil about the same time. ''The new teachings of Luther were beginning to gain favour''; Montaigne said in after years, ''and to shake our old faith in many places''.

Sir Thomas More, the author of Utopia, whom Swift called ''the person of greatest virtue this age has produced'', lost his head in 1535, because he was too honest to conceal his religious opinions. On the other hand, his friend Erasmus, the great apostle of Tolerance, ''by not making'', as he said, ''a post of himself for every theologian to defile'', managed to round out his three score and ten with his head still upon his shoulders.

Rabelais, with whom Montaigne was to share the honour of stabilizing the many French dialects into a literary language, was writing *Pantagruel* when Montaigne was born, and died when Montaigne was twenty. The two men who had performed a similar function for the English language, Wycliffe and Chaucer, had been dead a century and a half.

In this same fourth decade, the great Copernicus, priest and physician, had completed his planetary theory, which was published when he was dying (1543), and as these were the days of the Holy Office and his book under the ecclesiastical ban, it is not likely that Montaigne was familiar with it. There is little evidence in his writings to suggest that he ever believed the earth turned on its axis, but this must not be held against him. Sir Thomas Browne, one hundred years after, refused to accept the theory because ''it contradicted scripture''. He does however make some allusion to the change in the calendar. In 1563 the year began on January 1st. Previously, New Year's Day might be at various times, March 1, Christmas Day, or Easter Day. In 1582 Pope Gregory the Thirteenth, to correct the calendar, suppressed ten days, so that Montaigne was really ten days older than the date appearing on his tombstone. For part of his life at any rate, he had reason to consider the movements of the heavenly bodies.

Pierre Eyquem's strange ideas of the rearing of children seem to have reached fruition when his third son was born. Michel was put out to nurse in a peasant family, people of the lowliest fortune, who became his god-parents, and held him over the baptismal font. He learned Latin without tears, by hearing no other language till he was six, when he was sent to the college of Guienne at Bordeaux. Here a wise tutor guided him through Latin literature, which he knew in later years, better than French. Unfortunately, his mother was excluded from his life, perhaps to prevent him becoming a Protestant. This may be the reason he mentions her only once, and then he thanks God that she brought her son into the world as naked of genius as of clothes.

At twenty-four he was at work in the *parlement* of Bordeaux, something like our high court, and one of the eight established throughout France; but the cruel tortures and horrible mutilation of the criminals, some of which he was compelled to witness, made his position repugnant. Out of his association with the court, however, came an intense friendship with another judge, Etienne de la Boëtie, which ended

with tragic brevity, and cast a deep shadow over Montaigne, reminding one of Tennyson and Hallam. Montaigne felt rather bitterly over the part the doctors played in his friend's illness, and had a conviction that La Boëtie might have recovered but for the ill advised ministrations of his physician.

For a short time after he gave up his position on the bench, he saw some life at the Court of both Charles the Second and Henry the Third, and later of Henry of Navarre. At thirty-three he married Francoise de la Chassaigne and five years later, with a substantial patrimony, he made his hegira to the estate of his ancestors. On the walls of his study he inscribed in Latin:

"In the year of Christ 1571, at the age of thirty-eight, the eve of the calends of March, his birthday, Michel de Montaigne, long wearied of the slavery of the courts and of public functions, while still in health, returns to the bosom of the learned Virgins, where in quiet and security he hopes, if the fates allow, to pass what may be left him of a life already more than half spent, consecrating his ancestral dwelling and sweet retreat to his liberty and tranquillity and leisure."

In the third storey of a tower, forming an angle of a large courtyard, he had his study and his library, circular in shape, so that he could see the five rows of his books at a glance. These numbered perhaps a thousand, a large collection for the time, with five volumes on law and medicine. There was room enough for him to pace up and down, for "my thoughts go to sleep if I sit still. My mind will not move unless stirred by my legs". Here he wrote most of his essays, as he went "sniffing about among books, now here, now there, for the sentences which please me, not to store them, for I have no store house, but to transplant them to this book, where to tell the truth, they are no more mine than they were before".

His rule in this sanctuary was absolute and he was protected from the invasion of acquaintances, children and even his wife. Here this man, who was afterwards called the "Prose Horace" and the "wisest of Frenchmen", penned a work too hard for the teeth of time, which "grew amidst the stir of battle and itself became the battleground of centuries"; a singularly vital book, coming home, in Bacon's phrase, "to the business and bosoms of men with a curiously discursive directness". He had solitude enough to give him time to take counsel of his pillow; and quiet to take the place of the forty days which every philosopher should spend in the wilderness. This is not always necessary to deep thinking. Socrates replied to Alcibiades, who wondered how he could stand the perpetual din of the scorching tongue of Xanthippe, *virago intacta*, "I am like those who are accustomed to the regular sound of the water-drawing wheels".

He probably engaged an amanuensis for most of his essays. In the last few years of his life, Mme. de Gournay, whom he made his adopted daughter, gave him great assistance, and after his death, published an edition which was received as a classic.

To understand the religious wars which swept over all Europe and came to Montaigne's very door, one must appreciate the mediæval mind. The salt of the ocean of theology in those days was its strict, fanatical insistence on baptism and orthodoxy as the only alternative to everlasting misery. Heaven was nearer than the roof of the house, and hell nearer than the cellar. St. Thomas Aquinas wrote that there would be "a more blissful heaven through the sight of hell" and Gregory the Great said "The bliss of heaven will be sensibly increased by the sight of sinners writhing in hell-torments below". Religious fanaticism, drunk with the longing for immolation, was found in all the Christian sects, and in Mohammedanism. But the questions which perplex modern historians are why the dark cloud of intolerance hangs over the Christian church of the early Middle Ages, and why the Christians could preserve their enmity to one another. "The ancient Christians were animated by a contempt for their present existence, and a just confidence of immortality, of which the doubtful and imperfect faith of modern ages can give us no adequate notion." At this period in Europe even a little mutual indulgence might have produced religious concord, but we observe that "those who found themselves in the majority refused to their more scrupulous brethren the beliefs which at first they had humbly solicited for their own practice". They were soon to find in this civil commotion over a matter of church government, that "presbyter was but priest writ large".

Although the grip of theological dogma compelled Montaigne to join the King's forces, he never actually entered battle. Even when soldiers invaded his home, and when he was later thrown into prison, there was only short interruption to his contemplations. This calls to mind Sir Thomas Browne who, while England was being torn with her civil war, pondered in his study upon Pharaoh and the songs the sirens sang. The district of Montaigne's Chateau was the heart of the tumult which followed St. Bartholomew's Day (1572), "always," he said, "the first and last battle-ground in our disturbed times, where peace never shows her full face". In the midst of rape and rapine, when the flames from his neighbours' houses reddened the midnight sky, he wrote:

"Shall these my fields, so fairly dressed,
By godless soldiers be possessed?"

In an age when religious strife was rending asunder the Mother Church, it is noteworthy that Montaigne refused to be drawn into the bitter intolerance which characterized both sides. In his family were three Protestants, his mother and two children, and no doubt the absence of religious discord in their own home life had much to do with his sympathy for

other beliefs. His own views on religion, which were remarkably broad for his time, again recall Sir Thomas Browne, a century later. Both these men had ideas on the subject much like many physicians of later times, a combined belief and unbelief, grafted by the character of their studies on a personality inclined to faith, and fortified by close association with the stark elementals of existence, Life and Death,—the fundamental mystery of the cry of a new born child and the perpetual pathos of Rachel weeping for her children.

Although Montaigne fully appreciated that the infinite was unknowable, he always had great respect for the Church. His scepticism, though real, was not synonymous with negation. Brought up in the Catholic faith of his father, he was regular in his paternosters, but his orthodoxy was not that of the parish priest, and he objected to roasting a man's body for his supposed spiritual good. It was perhaps the Hebraic taint in his mother's blood which caused him to have no comfortable belief in the vicarious sacrifice. He too, like many unorthodox thinkers of his age, felt the weight of the Holy Office, and suppressed, under compulsion, some sentences of the first edition. But in spite of the objections of the Church, some of these were slipped back into the later editions. The authorities also censured him for his complimentary remarks upon a Protestant poet.

The whole of the famous "Apology for Ramond Sebond" is now considered to be an attack on Christian beliefs in general, so veiled that Montaigne hints to the wise to catch his meaning. He had little patience with the fine-spun theories of all ecclesiastics. "It is Socrates' opinion, and mine too," said he, "that the wisest theory about the Gods is to have none at all."

Montaigne was never martyr-hot. He considered it vanity to hold religious views too firmly because there is no means of knowing anything about these exalted matters, and his ideas may be wholly wrong. It is much better to be sceptical and tolerant and to conceal his thoughts discreetly, especially if they do not meet with the sanction of the Inquisition. A century later his works were subjected to ecclesiastical censure, and placed on the Index, probably because in one of his essays he credited animals with reason, and thus imperilled the doctrine of human immortality.

HIS MEDICAL HISTORY

Although he said he had been ill "pretty often", he had never called a doctor or taken their bitter prescriptions. In early life he fell from a horse and had a severe hæmorrhage. His appetite was good, he liked his meats rare and high, and his drinks, in summer, exceeded the Augustan limit of three, nor would he violate Democritus' rule, which forbade stopping at four, as an unholy number; therefore he slid on to the fifth, if need be. Tobacco had not yet been introduced to France.

His eyes were affected by any dazzling light. At fifty-four he could see as far as ever he did, but found difficulty in reading—"an exercise that has always tired them, but especially at night-time". His teeth were good "even to excellence" and he was past middle age before he lost one, "without drawing and without pain; it was the natural term of its duration". From childhood he had madness in his feet "or quicksilver, so restless and fidgety are they wherever I place them."

At the table he ate greedily and often bit his tongue, made little use of his fork and spoon, but used his napkin freely and recommended the German custom of a new one with each course. He was not as dainty as Chaucer's Prioress, who

> "Let no morsel from her lippes fall
> Ne wette hir fingres in the sauce depe.
> Wel coude she carie a morsel and wel kepe
> That no drope ne fille up-on hir brest."

All his life he had difficulty in remembering names. "If I should live long, I do not think but I should forget my own name." His wife's business ability saved him much trouble in the management of the estate, for Montaigne was easily lost with figures, like Socrates, who was never able to count up the votes of his tribe and report upon them to the Council.

This slender and energetic man spoke in a loud voice, and was inclined to be voluble and imperious, so that his conversation often became a monologue. As he reached the age of discretion he became more indiscreet. "The memories of our sins and our transgressions are often the most dear of our possessions", and he confesses to "two touches" in his youth. Fracastorius published in 1530 the poem that gave the name to Syphilis, at a time when this "Neapolitan disease" was pandemic in Europe, but we can only record on this patient's history sheet, "Wassermann not taken".

HIS MALADY

When he was forty-five and had reached, in Lord Tweedsmuir's pleasant phrase "the other side of the hill", he had the first symptoms of the disease which was to torment him for the rest of his life—kidney stones.

> "Just as old age is creeping on apace
> And clouds come o'er the sunset of our day,
> They kindly leave us, though not quite alone
> But in good company, the gout or stone."

This had a most profound effect upon his outlook on life, as it has done with others many times since. "Cromwell was going to ravage the whole of Christianity" Pascal says. "The royal family was lost and his own would be forever powerful, except that a little grain of

sand happened to lodge in his ureter. But that tiny bit of gravel, hardly anything at all, forsooth, in such a place brought on his death, humbled his family and re-established the King."

Of all the misfortunes of old age it was just the one Montaigne dreaded most.

"I could not have selected one of which I have a greater horror since childhood. In the eighteen months or thereabouts that I have been in this disagreeable plight, I have learned to put up with it. I am already compounding with this colicy existence, and I am finding a source of comfort and hope in it. Men are so accustomed to hug their miserable existence, that no state is so wretched that they will not accept it, provided they live. I have already experienced five or six very long and painful attacks of it. . . . But the pain itself is not so violent, so sharp and piercing as to drive a sober-minded man to rage and despair. . . . I have suffered . . . . a little more patiently, and I stop short at groaning, without braying, . . . I moan, I fret and fume when I am in the throes of a sharp attack, but I never yield to despair. The attacks recur so frequently that I hardly ever feel in perfect health—a painful and uneasy existence."

He owes this "stony propensity" to his father, who died at seventy-three grievously tormented with a large stone in the bladder. The symptoms began when he was sixty-six. Montaigne's acute and inquiring mind suggests the perfectly scientific and natural question How does this come about?

"If any man will enlighten me about the source of this mischief, I will believe him in any other miracles he pleases; provided he does not put me off with a theory, as they generally do, that is much more obscure and fantastic than the thing itself. I hope the doctors will excuse my freedom a little, for it is by the same fatal infusion and insinuation that I have inherited my hatred and contempt for their science. My antipathy for their art is hereditary."

Three generations of his paternal ancestors had lived to old age without tasting any kind of physic.

But there were still a dozen years ahead of him of this "the worst, the most sudden and the most painful, the most mortal and the most irremediable of all diseases". The description he gave of the acute attack has never been equalled.

"Thou art seen to sweat with pain, to look pale and red, to tremble, to vomit well-nigh to blood, to suffer strange contortions and convulsions, by starts to let tears drop from thine eyes, to urine thick, black and frightful water, or to have it suppressed by some sharp and craggy stone that cruelly pricks and tears thee."

A man in such torment wants no physician who only "charms ache with air and agony with words". He is as comfortable as St. Lawrence on his red-hot gridiron, as Horace Walpole wrote of himself during an attack of gout. But in spite of the excruciating pain, he never arrived at such a degree of despair as to bellow and make uproar. It was never so bad that he was not able to speak, think, and give a satirical answer. Like Epicurus, caressed with the gout, he defies his ills with a gay heart.

"My mind says to me 'It is for your good that you have the stone: at your age the edifice has naturally to suffer. It is the season when it begins to come loose and give way . . . . you must find comfort in the idea that you are in company, since you have fallen into the most common infirmity of men of your time of life . . . . an honorable fellowship. There is something noble and dignified in it'. But you do not die because you are ill; you die because you are alive. It is a malady that chastises those of your members through which you have most sinned; you are a man of conscience."

And so, by such Stoic philosophy, he considers that there are many privileges enjoyed by a sufferer from stone, compared with those who have other maladies. Over a period of fourteen years he passed on an average one stone every four weeks.

"Once a month, if you do not embrace death, you at least shake hands with him. . . . When the attack is mild it makes me afraid, because then it has come to stay some time. But normally the attacks are brisk, vigorous and extreme; they shake me to pieces for a day or two."

He had the same physical courage as another French philosopher, who, while waiting in his cold cell for the tumbril to carry him to the guillotine, had a violent fit of shivering. "What, carcass!" said he, "you are trembling? Wait till you see where I am taking you at dawn!" But once the attack is over,

"Is there anything so delightful as the sudden change, when after extreme pain, by ejection of the stone, I recover, as in a flash of lightning, the beautiful gift of health, so full and so free, as happens in our sudden and sharpest attacks of colic? . . . Nature has give us pain that we may better appreciate pleasure and painlessness."

Montaigne understood now the dainty and pleasurable itching that Socrates felt in his legs when his jailer relieved him of his irons. However, there were times when, he says, "the obstinacy of my stones has sometimes caused so long a suppression of urine, for three, even four days, and brought me so near death, that considering the cruel strain this state puts upon me, it would have been madness to hope, nay to desire to avoid it". While he was being sawn in pieces by the grating tortures, he meditates upon the fiendish cruelty of Tiberius, past master of the hangman's art, who tied off the urethras of his criminals that they might die in the agonies of urinary obstruction.

In 1580, after several years of nephrolithiasis, and his body "shattered by the mastering flight of time", he set out on an extended journey to the watering places of Europe, seeking nepenthe finally in the famed baths of Lucca. The record of his travels disappeared at his death, and was not found for one hundred and eighty years, reminding one of the manuscript of Boswell's *Journey to the Hebrides,* recovered a few years ago in an old croquet box in Malahide Castle; and of the recent discovery, more than a century after it was written, of the autobiography of

Oliver Goldsmith, grandnephew of the famous Oliver, and Canada's first native poet (1794-1851).

The difficulties of travel in Montaigne's day made contemplative writing impossible, and for this reason, if for no other, the *Travels* fall short of his essays. He was able, however, to make pungent comments on the customs of the people he met. The barbaric German arrogance, drunkenness and boastfulness seems to have changed little from his time, but he liked their foods, their inns and warm feather coverlets, and preferred their stoves to the French fireplaces. His courage was remarkable. After a sleepless night of torture from incessant pain, he rises before daylight, breakfasts on bread and fruit and then rides fifteen to thirty miles on horseback, and keeps this up for eight weeks. It may be that he hoped with such a Spartan regimen to harden himself by persistence, and to correct his constitution, as Cæsar did his epilepsy, "by dint of despising and fighting it". The record of the stones passed and their consistence shows however, little improvement.

In spite of his disability, his mind was active, and his appetite for new horizons unimpaired. His consuming interest in the affairs of men and in the many novelties seen in a foreign land, took him to cardinals and courtesans, to spas and shrines. "After an uneasy night" he writes "I would rise eager and lively, remembering that I was about to sally forth to see some fresh town or district."

At last his long search for health brought him to the baths of Lucca, where for five months he "took the cure", submitted to a rigorous regimen, and was much improved for a time, either from the water or the "mass-psychology"; but in the end his old symptoms reappeared. A message from Bordeaux informed him that he had been offered the position of mayor, so he left Italy immediately.

Throughout his active literary years he makes many references to death. It was constantly present in his thoughts during the Civil wars when 800,000 of his countrymen lost their lives. He called himself a philosopher, whose whole life, as Cicero said, was a meditation on death. He also quotes Cæsar's grand sanity that makes him one of the most illuminated minds in history. When Pausa and Hirtius remonstrated with him for going without a bodyguard, Cæsar replied "It is better to die once than always to go in fear of death". On another occasion when asked what death he thought the most desirable he said "the least premeditated and the quickest". Montaigne thought that we overrate ourselves when we look upon death as a great matter; not one of us lays it sufficiently to heart that he is but one. "We are not so intimate with heaven" he quotes from Pliny, (who himself died in the destruction of Pompeii) "that the light of its stars should die at our death. . . . A quick death is the supreme good fortune in human life".

> "As life is no better for not being long
> So death is the better for not being long."

Erasmus too, like many gifted men, but unlike most theologians, expressed a hope for sudden death, and declared it to be one of the greatest blessings which a human creature can receive. Montaigne wished that death might find him planting cabbages, and on another occasion said he would rather die on horseback than in bed.

> "First our pleasures die—and then
> Our hopes, and then our fears—and when
> These are dead, the debt is due,
> Dust claims dust—and we die too."

In the beginning of September, 1592, he was failing rapidly and died on the thirteenth. His physicians said he had a quinsy, accompanied by a paralysis of the tongue, for he was unable to speak during the last three days. Modern medicine would probably say that he had uræmia with œdema of the glottis, not an uncommon *exitus* for those suffering long from nephrolithiasis.

MONTAIGNE AND THE DOCTORS

It is quite reasonable to think that a man whose scientific mind could rid itself of the logical quiddities and sophistical syllogisms that clouded his day, would have turned to the study of medicine, where he has ample opportunity to fight for moderate ideas, and employ all his mental acumen in defence of common sense. He might have been able to hold up the hands of his contemporary, this newcomer called Paracelsus, and bring great changes into the art. There was certainly urgent need, for medicine was at a low ebb. Even a century later here is what Lesage (d. 1747) makes Gil Blas say to his preceptor Dr. Sangrado, during an epidemic of small-pox:

> "Sir, I call to heaven to witness on the spot that I have never strayed from your infallible methods and yet I have never saved a patient; one would think they had died out of spite and were on the other side of the great medical question." To which Sangrado replied, "I have published on the practice of bleeding and the use of drenches. Would you have me cut the throat of my own fame as an author? Bleeding and drinking warm water by pailfuls are the two grand principles, the true secret of curing all the distempers incident to humanity . . . . the sum total of my philosophy."

But the study of medicine never appealed to Montaigne, perhaps because of the Dr. Sangrados and other little pulse-counters he knew, but also because his sympathy for those in distress was so strong.

> "I take possession of the disease, I am concerned at it and lay it too much to heart." And in another connection, "I have found that when I enjoyed good health, I pitied the sick much more than I think myself to be pitied when I am one of them. I have a very

tender compassion for another's afflictions and could readily weep for company. . . . The dead I can hardly pity, but I greatly pity the dying, if I were able to shed tears on any occasion."

These personal characteristics and the hereditary antipathy he bore to medicine, took him into the law, in which he was grievously disappointed. "I cannot even look upon the executions of the law . . . . with steadfast eye".

His dislike for the medical profession found confirmation in the classics. Æsculapius was killed at the bidding of Pluto, who found that the inhabitants of Hades were dwindling. Hadrian, on his deathbed exclaimed that the crowd of doctors had killed him. A poor wrestler took up medicine. "Bravo", said Diogenes, "You are right; you can now throw those who once threw you". Doctors have this good fortune, according to Nicocles, that "the sun shines on their successes, and the earth hides their failures". Pliny twits the doctors that when they are at the end of their tether, "they have hit upon this pretty shift, to send the patients they have teased and tormented to no purpose with their drugs and dietings, some to seek assistance and miracles, others to the hot springs. They have a third device . . . to send us for a change of air to some other country."

His own observations caused him to look askance at the doctors' pharmacopœia—the left foot of a tortoise, the urine of a lizard, a mole's liver, blood drawn from under the right wing of a white pigeon; and for those who had stone, the pulverized droppings of a rat, "and other tomfooleries that are more suggestive of magic and spells than of a serious science". There were also pills to be taken in odd numbers, herbs to be gathered at certain magic times, and "the grim scowl, the wise and learned looks and demeanour which they put on and which even Pliny remarked upon with derision". What will a writer four centuries hence say of our present practice with its pregnant mares' urine, cow's ovaries, the liver and pancreas of a pig, moulds and maggots!

The "perpetual discord" among the disciples of Æsculapius has always been a favourite subject for satirists, and Montaigne again finds something in Pliny, who exclaims that "the most important science we practice, as having charge of our health and preservation, is unfortunately the most uncertain and most confused, and is more disturbed by changes than any other". Their great masters, Hippocrates, Æsculapius, Galen, Erasistrates and a host of lesser ones, could never agree even on the original cause of disease. And when the doctors had their consultations what an exhibition of hatred, jealousy and self-consideration over their guesses and the weakness of their arguments: "who ever heard of a doctor using a colleague's prescription without taking something from, or adding something to it?" Physicians, if we are to believe Plato, were the only men that "might lie in all freedom, since our health depends on the falsity and emptiness of their promises. . . . When an unfortunate accident occurs, they will disclaim all responsibility and lay the blame on the patient; and they take care never to be at a loss for any number of frivolous reasons such as 'he must have left his arm uncovered'; 'somebody has opened the window'; . . . 'he has been lying on his left side'; . . . even 'thinking of something painful', or a 'dream'." Were the two latter a forecast of psychoanalysis?

Before Montaigne was afflicted with his gravelly tyranny he heard of a marvellous preventive of stone, spoken of, by "intelligent people" as infallible in action. This was the blood of a he-goat, fed in a specified way. Montaigne's versatile mind led him to try the experiment, but when the animal was killed, three bezoars or enteroliths were found, from which he deduced that "it is very hopeless for those afflicted with gravel to expect a cure from the blood of an animal that is about to die of a like disease". There were then, as now, many vaunted treatments, such as the pill with one hundred accurately calculated ingredients, but Montaigne would have none of them. "Only fools allow themselves to be persuaded that that hard and solid body, baked in your kidney, can be dissolved by drinking". He knew by experience that "Once it is shaken up, there is nothing to be done but to give it passage; and for that matter, it will make one for itself".

Of the doctors' claim of infallibility in the use of their drugs, he has this to say:

"More than two-thirds of the medicinal virtues consist in the quintessence or occult property of simples . . . . of which we cannot, by our reason, find out the cause; as when in wool . . . . they accidentally find some occult desiccative property which cures chilblains in our heels; or when in radishes . . . . they detect some aperient action."

Some physicians say they have been led by the example of certain animals. A horse never drinks when he is eating, *ergo* man should follow the same rule. Other physicians say they were led by no other guide but chance: we still are, *e.g.*, penicillin.

"And then, even should the cure be effected, how can the doctor be assured that it was not because the disease had reached a crisis, or that it was not the result of accident, or that it was not due to something he had eaten or drunk, or to the power of his grandmother's prayers?"

This again is a tribute to Montaigne's intellect, and is one of the observations which make him so intensely modern.

"But supposing this proof to be perfect, how many times was it to be repeated? How often has this long bead-roll of chance and co-incidence to be strung anew, to infer a certain rule therefrom? Should it be inferred,

and by whom? Among so many millions there will be but three men who trouble about recording their experiments; will chance have lighted upon just one of these three? What if another, or even a hundred others have had contrary experiences? We might perhaps see some daylight if all the reasonings and all the decisions of men were known to us; but that three witnesses, and these three doctors, should lord it over mankind is against reason."

After four hundred years these remarkable sentences still contain the law and the prophets of scientific research.

His own experience of the French physicians seemed to prove that none of them came near this high logical standard. Because he knew personally more about stone than any other disease, he turns his shafts of criticism on the various treatments that had been offered him. These doctors had theories which flowed into such weird channels as today meander through swamps on that side of Parnassus where the sun never penetrates. Stone left little scope for guessing, yet the diagnosis was not always cut and dried. He once urged his friend, a bishop, to have an operation for vesical stone; when the bishop "was dead and opened, it was found he had only kidney trouble". But there is less conjecture in surgery, where the operation quickly reveals the condition, while the physicians at that time had no speculum to look in upon our brain, our lungs and liver.

The very promises of medicine are incredible. How can doctors apply their nauseating drugs to allay the diseases which affect two organs at the same time? How do they know that one medicine goes to warm the stomach and a second to cool the liver? In another mixture "one of the drugs has received its orders to proceed directly to the kidneys, nay even to the bladder . . . . and by its occult property to preserve its power and virtue on that long journey, fraught with obstacles, until it reaches the place it is intended to benefit?" Are we out of this Serbonian bog yet?

"It never occurs to our doctors that he who sees to all, sees to nothing. . . . Whilst they are afraid to arrest the progress of a dysentery, in order not to bring on a fever, they killed me a friend (Boëtie) who was better than the whole pack of them put together". The Egyptians were right to reject this trade of the general practitioner and to break up the profession—to each disease and each part of the body, its own workman. "This is how they go on trifling and juggling with their reasons at our expense. And they cannot provide me with a proposition to which I could not construct one of equal force".

But all the doctors were not dishonest and ignorant blunderers. During the epidemic of the plague, when Montaigne was forced to leave his chateau for six weeks, one of the most reputed physicians of the district published a pamphlet in which he confessed that bloodletting was one of the chief causes of the high mortality.

His criticism of the physicians was not however entirely destructive; he offered them at times some really good advice. Medicine professes to make experience the touchstone of its actions. Every doctor should therefore have passed through all the diseases he professes to cure and to be familiar with all the accidents and circumstances on which he is to give an opinion. It is but right that he should catch the pox (spirochætal) if he would know how to treat it. In another context he says "A grumpy and disagreeable doctor never did any good". There could be no excuse for the type of science and learning that desiccates the soul and makes complacent, conceited pedants. "Great abuses in the world are begot by our being taught to be afraid of professing our ignorance and that we are bound to accept all things we are not able to refute."

He believed the modern theory of contagion —"an infected body communicates its malady to those that approach or live near it, as we see in the plague, the smallpox and sore eyes that run through whole families and cities". He had also a clear idea of natural immunity, for he had "very well escaped the epidemics of his day". But some of his opinions have not stood the litmus test of time. He accepted the cautery, the seton, the value of bleeding, and many another doctrine long since discredited, like maternal impressions, which had the biblical authority of Jacob's "ring-straked, speckled and potted" goats.

When Cicero sailed from Italy to escape the proscription of the second triumvirate, he turned back because he decided that seasickness was worse than death. For a similar reason, Montaigne omitted the sea journey to Genoa, but he already had experimental evidence enough to contradict Plutarch's theory that it was caused by fear, for Montaigne had no fear of the sea. Furthermore animals, particularly pigs, are very commonly afflicted. Rather, Montaigne thought, it was the interrupted motion which disturbed him, and he used the abdominal binder, still in great vogue by those who go down to the sea in ships.

His judgment of the miraculous cures commonly reported at the spas he visited, is quite modern. He found them "ill-grounded and untrue. The waters stimulate the appetite and inspire us with fresh energy". His ideas of the current superstitions of the day were far in advance of his contemporaries. Black cats must not be taken too seriously and witches deserved to be treated with hellebore, the remedy of that day for insanity, rather than with hemlock. At the end of the eighteenth century, John Wesley said "Giving up witchcraft is, in effect, giving up the Bible". In Ireland, even as late as 1895 a witch was sup-

posed to have burned. Miracles, visions, enchantments and other extraordinary phenomena derived their credit chiefly from the power of imagination, and the credulity of the common people. Those who in serious illness "moan and utter heartbreaking sighs" are not always in pain, and consequently not greatly to be pitied. Words spoken under such circumstances are accidental rather than sensible.

Just to show the spacious mansions of his mind, there is the prophecy he made about tanks, to be fulfilled four hundred years later. In an essay on the "Arms of the Parthians" he said: "And now that our musketeers are so formidable, I believe that a means will be discovered of immuring us to save us from them, and of dragging us into war shut up in bastions, like those carried by elephants in antiquity."

But while the doctors were rich in promises their results were poor enough to provoke the ironic laughter of the gods. Towards the end of his life he wrote: "By heavens! If only medicine should some day give me real and perceptible relief, you would see how I could exclaim in good earnest 'At length to potent science I surrender!' (Horace)."

When the flight of years had mellowed him down, he confessed to no ignorant and superstitious prejudice against medicine and its professors, and certainly his discussion of doctors was more reasonable and dispassionate than many of the other subjects over which his tireless fancy roamed.

"I do not guarantee that I may not some day be borne away to this absurd notion of committing my life and health to the mercy and government of the doctors; I may fall into such a frenzy that I too, should anyone ask me how I am, may answer with Pericles 'You may judge from this', showing my hand filled with six drachms of electuary. That will be a very evident symptom of a severe illness. My judgment will be marvellously unhinged . . . . my soul in a very violent fever. . . . On the whole I honor the physicians; not in accordance with the precept because they are necessary, but from love of themselves, having many honest and likable men among them. It is not them I attack, but their art; and I do not greatly blame them for taking advantage of our folly, for the world does so. Many professions, of both greater and less repute than theirs, are built up by, and rely upon the deception of the public."

What is the mystery about this republican of French thought that his book should be found in Shakespeare's library, should lie on many bedside tables of the present day and is compulsory reading in several departments of our universities? Montaigne found his chief satisfaction in contemplating the monuments of unaging intellect of Greece and Rome, and goes down through the years sipping with a fine gusto the flavoursome experiences of the past; but this is not enough to hold the attention of the world for four centuries. Part of the answer is that he puts himself completely in his works, and like Pepys, entertains himself without thought of posterity. His essays are a conversation with the reader, sometimes, as Emerson noted, "in biblical plainness and uncanonical levity", the talk of a man intelligently interested in the world he inhabited. As he communes with our Lady of the Inkwell in the quiet of his study, where he hoped for serenity and ease of heart, he dealt with life as he found it from day to day. His good sense, his anxious observance of the golden mean and his modernness made Madame de Sevigny exclaim "A charming man! What good company he is!" Cardinal Duperron, his contemporary, called his work the "Breviary of Honest Folk" and Christian (1842) referred to it as the "Book of Good Faith".

Not all his essays are of equal merit, for he says he "did not learn what was the rule of life until it was used up" and thus became an unpremeditated and accidental philosopher. He went through that period of mental growth where, as Descartes said, "no man can aspire to the name of philosopher who has not, at some time in his life, doubted everything he has been taught". Then he struck hard at the scholasticism of his time, which sought to gratify the universal desire of the human mind to have everything accounted for. The reign of ideas had just begun. Historians who seek to explain *le grand siècle* (18th) when French civilization reached a period only less glorious than that of Pericles, but hardly less renowned, consider that the fire which first glowed on the heights was lit by Montaigne. He was certainly the first in France to sustain the liberty of the mind in the face of opposite opinions, a course of action requiring great moral courage, an indomitable spirit and a temper of steel. This was an extremely hazardous undertaking, because the Inquisition called scepticism "atheism". and after 1527 stamped it out ruthlessly. However, he escaped with only modest clerical protests, perhaps because his penetrating criticisms were an admirable corrective for dogmatic absurdities and pious frauds. He was not a crusader against religion, but against church government. He was one of those thinkers, rare in every age, "who fight violently for moderate ideas, and who employ every resource of a fiery soul to defend common sense."

But the characteristic virtue of all his essays, which touched on nearly everything of human interest is Tolerance, the eldest child of Reason. "No propositions astonish me" said he, "no beliefs offend me, however much opposed to my own." Without tolerance, the intellect remains the slave of superstition, and he took off the padlock of traditional prejudice from the door of his own mind. In his pages, pale Malice, speckled Jealousy and Envy "the coal that came hissing hot from hell", nowhere show their heads. Our debt to him is deep. He appeals because he seems "to bridge the centuries which separate him from us and to

touch on matters which we think are peculiarly our own".

If we had hearkened to the teaching of Montaigne and those who came after him, we should have heard little of the cynical contempt for the worth and dignity of man that causes some European nations in desperation to surrender their will to tyrants, who lead them down the blind steep of slavery. Nor on this continent, where the searching for ulterior motives has become a national pastime, would we cease to respect the common principles of humanity in others and in ourselves. Montaigne preached the divine right of the ordinary man and the rule of law which gave us freedom to possess our own souls, and because he desires to come at the truth, he puts himself above rage and prejudice. A life without knowledge or reflection is unworthy of respect. "The great and glorious masterpiece of man is to know how to live to purpose; all other things—to reign, to lay up treasure, to build, are at most but little appendixes and props." This is the key that unlocks the gates of Paradise.

421 Bloor Street West.

SIR THOMAS LEWIS

By J. C. Meakins, M.D.C.M., F.R.C.P.[Lond., Edin., C.], F.R.S.C.

Montreal

A great loss has befallen medical science in the death of Sir Thomas Lewis. There was a time when one might have said that his loss concerned only London practice or English Medicine, but the practice of medicine in the narrow sense could not hold him. I remember well his first consulting rooms, which were chiefly distinguished by his absence, in the cellar laboratories of University College Hospital Medical College. Nor did he keep these rooms for many years. He apparently realized that his heart was not in the work which required his presence, but rather in the outpatient department and the laboratories of "Clinical Science".

It is particularly important, if Lewis's place in medical science is to be appreciated fully, that the trends of medicine of those early years should be understood. Pathological anatomy as a descriptive discipline had dominated medicine for many decades and as so often happens when one theme is carried to its narrow conclusion it had reached a dead end. But quietly there was appearing on the horizon of medicine a new day. Physiology which had sprung from the loins of anatomy in the English School was giving hope of a more dynamic approach. It would be invidious to attempt to select all of those whose thoughts and writings may have directed Lewis's thoughts in this direction, but it may be permissible to mention two of many. Swale-Vincent was professor of physiology at Cardiff during the years of Lewis's student and early graduate days. About the same time there came out of Lancashire the writings of a Scotchman who was a true clinical experimentalist. There seems little doubt of the influence of Sir James MacKenze's original approach to the analysis and interpretation of cardiac arrhythmias and circulatory failure on Lewis's approach to scientific medicine. Lewis was an expert in the application of MacKenzie's polygraph in clinical observations, but his scientific heart glowed with the great opportunities and wider experimental possibilities of the Einthoven galvanometer. This instrument provided him with an exactness of record which, other things being equal, could be repeated experimentally in the same and varied phases as often as considered necessary. The only thing which was not always equal was the experimental variant of the human factor. I think that this always haunted Sir Thomas, who really worshipped perfection in science. He often warned me that a man's worst enemy in scientific research was his tendency to see what he wanted to see. We would call it today "wishful thinking!"

As a master Lewis was superb. He was a hard driver and did not tolerate those who did not work long and persistently. He tried you first with a subtlety of neglect which was hard to bear unless both the flesh, spirit, and determination were strong. It was his way of eliminating the weak and the dilettante, and withal satisfactory to everyone. He was demanding but encouraging. His smile of approbation made the sun shine even through a London fog made worse by working in a photographic dark room in a cellar. But he was also a strict scientific father who kept his children well under his eye. I well remember his consternation and apparent wrath when he found two of us out of the "bounds" of time. We were behind in two things, first, the calibration readings of some experiments, and second, acquiring more knowledge of clinical electrocardiography. If we finished the first he could perhaps give no more time for the second. So we bribed the lab. boy for an extra key and went back at night to accomplish both. To our consternation, we heard the door open and the familiar out-of-tune whistle cease. We knew we were caught—just caught! A quick question, a stern but short reprimand (?) a quick, flashing smile and he took the centre stool and we worked till after midnight.* So it was for several nights a week thereafter. We accom-

* My *particeps criminis* was Dr. Paul White of Boston.

plished both of our ends so did Sir Thomas. The work went on that much faster. He was a hard driver but appreciated an ardent worker and showed this in many subtle ways. His shyness and reticence would never permit expression by the direct approach.

The fields of his scientific interests are well outlined by his publications. As all know, he founded the journal *Heart* and during its whole existence the greater part of its contents came from his pen or at least from his department, and the latter manuscripts were always carefully edited and often were practically rewritten by him. The change of name of this journal to *Clinical Science* was more than merely a new title page. This change represented two inward trends of no sudden origin. In the first place it revealed a fundamental belief which Lewis always held that clinical medicine could and should approach the standards of an experimental discipline; and secondly it emancipated him in the eyes of the profession from the belief that he was only interested in the heart as such. It was at least as early as 1913 that he was deeply interested in œdema. At that time he began in a tentative way to approach this subject through the medium of the *tache cérébrale* and "angioneurotic œdema". The medical world knows the results. So it was with pain. His inspiration came from the simple common things that are so often neglected. Pain to Lewis was not just a symptom of common design. To him it told a story which could only be understood by knowing its language. This could only be written in the last analysis by man—the sufferer. Its many features were as an alphabet—the periodicity, the intensity, the radiation, the quality, the presence of tenderness, and many other features had to be understood and estimated. To him it was not only the commonest of all symptoms but the most informative and elusive.

The medical world will miss Tom Lewis not only for what he did but what he stood for and where he was leading. His intellectual honesty had few peers and no superiors. May his race increase!

Canadian Medical War Services

MEDICAL OFFICERS APPOINTED TO THE R.C.A.M.C. — ACTIVE FORCE

APRIL, 1945

(*Previous sections appeared in the issues of February, March, May, July, September, November and and December 1943, in each issue for 1944 except April and September, and in January, March, April and May, 1945.*)

SECTION XXXVII

Name	*Address*	*Date of appointment*
Asselstine, J. L.,	St. Catharines, Ont.	15-3-45
Callbeck, G. R. M.,	Vancouver	15-3-45
Dodds, W. A.,	Toronto	15-3-45
Doidge, W. A.,	Toronto	27-2-45
Fox, C.,	New York City	19-3-45
Kauffman, P. P.,	Toronto	26-3-45
McCarley, J. S.,	Vancouver	15-3-45
Pearlman, L. N.,	Ottawa	20-3-45
Pollock, I. J.,	Toronto	15-3-45
Prueter, G. W.,	Waterloo, Ont.	15-3-45
Shulhan, M.,	Dundurn, Sask.	15-3-45
Teichman, B.,	Toronto	20-2-45

MEDICAL OFFICERS STRUCK OFF STRENGTH OF THE R.C.A.M.C.—ACTIVE FORCE

APRIL, 1945

SECTION XXXVIII

Name	*Address*	*Date struck off strength*
Bell, D. E.,	Toronto	20-3-45
Clarke, W. A.,	New Westminster, B.C.	2-2-45
Coulter, A. R.,	Weyburn, Sask.	23-3-45
Countryman, C. J.,	Leaside, Ont.	26-3-45
Currie, E. A.,	London, Ont.	19-3-45
Davis, H. R. L.,	Vancouver	22-3-45
Gorsseline, R. M.,	Ottawa	26-1-45
Harbeson, A. E.,	Kingston, Ont.	14-2-45
Haworth, G. C.,	Viking, Alta.	12-4-45
Kerster, J. K.,	Ogema, Sask.	6-4-45
Locke, E. E.,	Montreal	10-4-45
Loree, L. A.,	Guelph, Ont.	28-3-45
McFadyen, O. J.,	Fairview, Alta.	29-3-45
Povah, A. H.,	Kelowna, B.C.	12-4-45
Reingold, M. M.,	Toronto	5-3-45
Robertson, B. D.,	Montreal	23-3-45
Walsh, A. C.,	Vancouver	20-3-45
Watson, M. C.,	Toronto	1-3-45

Association Notes

PROGRAM
SEVENTY-SIXTH ANNUAL MEETING
OF THE
Canadian Medical Association
TO BE HELD IN THE MOUNT ROYAL HOTEL, MONTREAL,
JUNE 11, 12, 13, 14, 15, 1945

President - - - -	DR. HARRIS MCPHEDRAN, Toronto
President-Elect - - -	DR. LÉON GÉRIN-LAJOIE, Montreal
General Secretary - -	DR. T. C. ROUTLEY, Toronto
Local Honorary Secretaries - - -	DR. E. S. MILLS, Montreal DR. GEORGES HEBERT, Montreal

The Convention

DETAILED arrangements for the Seventy-sixth Annual Meeting to be held in Montreal during the week of June 11 are proceeding satisfactorily.

General Council will meet on Monday and Tuesday, June 11 and 12.

On Tuesday evening, General Council will be dinner guests of the Quebec Division.

A series of Round Table Conferences has been arranged for the mornings of Wednesday, Thursday and Friday, from nine to ten o'clock, to be followed by General Sessions.

Sectional Meetings will be held on Wednesday and Thursday afternoons.

The Annual General Meeting will be held on Wednesday evening, June 13, commencing at 8.30 o'clock. On this occasion the retiring President, Dr. Harris McPhedran, of Toronto, will hand over the badge of office to his successor, Dr. Léon Gérin-Lajoie, of Montreal. The meeting will be followed by music and dancing.

ROYAL COLLEGE OF PHYSICIANS AND SURGEONS OF CANADA

The Council of the Royal College of Physicians and Surgeons of Canada will meet on Friday evening, June 15, at eight o'clock in Salon B, continuing on Saturday, the 16th, if necessary.

The Committee on Specialists of the College will meet in Salon B at 2.00 p.m. on Friday, June 15.

FEDERATION OF MEDICAL WOMEN OF CANADA

The Annual Meeting of the Federation of Medical Women of Canada will take the form of a dinner to be held at the University Women's Club on Thursday, June 14, at 7.00 p.m.

Speaker: Dr. Kate Zerfos, Nashville, Tenn., American Federation of Medical Women.

Transportation will be provided from the Mount Royal Hotel.

CANADIAN ORTHOPÆDIC ASSOCIATION

The Canadian Orthopædic Association will meet in Salon B, Mount Royal Hotel, on Monday and Tuesday, June 11 and 12.

CANADIAN ASSOCIATION OF RADIOLOGISTS

The Canadian Association of Radiologists will meet in Salon I on Tuesday, June 12, with a meeting of the Council in the morning followed by a general business session in the afternoon.

The annual banquet will be held on Thursday evening, June 14.

CANADIAN SOCIETY FOR THE STUDY OF DISEASES OF CHILDREN

The Canadian Society for the Study of Diseases of Children will hold a business meeting in Salon F at 4.30 p.m. on Wednesday, June 13.

CANADIAN MEDICAL PROTECTIVE ASSOCIATION

The Canadian Medical Protective Association will hold its annual meeting immediately following the scientific program at 4.30 p.m. on Thursday, June 14, in Salon C.

President—Dr. J. Fenton Argue, Ottawa.

Secretary-Treasurer—Dr. T. L. Fisher, Ottawa.

CANADIAN SOCIETY FOR THE CONTROL OF CANCER

The Grand Council of the Canadian Society for the Control of Cancer will meet in the Convention Room on Friday afternoon, June 15, at two o'clock.

OBSTETRICIANS AND GYNÆCOLOGISTS OF CANADA

The Obstetricians and Gynæcologists of Canada will hold a scientific session in Salon D at 2.00 p.m. on Friday, June 15, followed by a dinner at 7.30 p.m. A business session will be held in the Convention Room on Saturday morning commencing at 9.30 o'clock.

INTER-SERVICE MEETING OF PSYCHIATRISTS

The National Committee for Mental Hygiene (Canada) is sponsoring an informal meeting of psychiatrists from the armed forces and the Department of Veterans Affairs to be held in Salon J, Mount Royal Hotel, Montreal, June 12, 1945. Civilian psychiatrists are also invited to attend.

At the morning session, there will be discussed problems of treatment and rehabilitation as they relate to service personnel.

The luncheon meeting will be addressed by Dr. Alfred P. Solomon, Director of the Veterans Rehabilitation Centre, Chicago, Ill.

In the afternoon, there will be a round table discussion on post-war interests of service psychiatrists, including problems of postgraduate training, employment and practice.

GOLF

No formal tournaments have been arranged, but if you wish to have a game of golf at any time during the week, see the Golf Committee at the Registration Desk.

CANADIAN ALLERGISTS

A group of Allergists from various parts of Canada will meet in Salon A on Thursday, June 14, at 4.00 p.m. (or immediately at the close of the scientific program) to discuss the advisability of organizing a Canadian Society of Allergists. Those attending are requested to be prepared to express their views on this subject.

CANADIAN UROLOGISTS

A meeting of Canadian Urologists will be held for the purpose of forming a Canadian Urological Association. At this meeting the Constitution will be submitted and any other business considered. Time and place of meeting will be announced by letter.

MEDICAL ECONOMICS

The following program has been arranged for Thursday evening, June 14, commencing at eight o'clock, in Salle Dorée:

The Place of the Government in Health Services

Dr. F. W. Jackson, Deputy Minister of Health and Public Welfare, Manitoba.

The Place of the Voluntary Plan in Health Services

Dr. J. A. Hannah, Managing Director, Associated Medical Services, Toronto.

A panel of discussants is being arranged.

SCIENTIFIC PROGRAM

Wednesday, June 13

ROUND TABLE CONFERENCES

9.00 – 10.00 a.m.

Dermatology

Chairman: **Dr. J. F. Burgess, Montreal.**
Subject: *Urticaria.*

Medicine

Chairman: **Dr. G. R. Brow, Montreal.**
Subject: *The Problem of the Hypertensive Patient.*

Obstetrics and Gynæcology

Chairman: **Dr. Hector Sanche, Montreal.**
Subject: *Pregnancy Complicating Tuberculosis.*

Ophthalmology

Chairman: **Dr. F. T. Tooke, Montreal.**
Subject: *Penicillin in Ophthalmology.*

Pædiatrics

Chairman: **Dr. J. Boyd Scriver, Montreal.**
Subject: *Implications of Non-diphtheritic Croup in Childhood.*

Radiology

Chairman: **Dr. W. V. Cone, Montreal.**
Subject: *Protrusion of the Intervertebral Disc.*

Surgery

Chairman: **Dr. A. L. Wilkie, Montreal.**
Subject: *Biliary Tract Diseases.*

Urology

Chairman: **Dr. Oscar Mercier, Montreal.**
Subject: *Radical Treatment of Bladder Tumours.*

GENERAL SESSION

Wednesday, June 13

10.15 a.m.

Dr. A. H. Gordon, Montreal.
Medicine in Montreal in the 90's.

Dr. A. D. Ruedemann, Cleveland, Ohio.
Differential Diagnosis of Proptosis (lantern slides).

Dr. Harris McPhedran, Toronto.
Valedictory Address.

The Lister Lecture.

Dr. O. H. Wangensteen, Minneapolis, Minn.
Studies in the Etiology and Surgical Therapy of Ulcer.

SECTIONAL MEETINGS

2.15 p.m.

Wednesday, June 13

Section of Anæsthesia

Dr. S. M. Friedman, Montreal.
Brachial Plexus Block.

Dr. Maurice Fortier, Montreal.
Therapeutic Use of Local Anæsthetic Agents.

Dr. Fernando Hudon, Quebec.
Le Pentothal dans la Chirurgie du Goitre.

Section of Historical Medicine

Wednesday, June 13

Dr. Gabriel Nadeau, Rutland State Sanatorium, Rutland, Mass.
Obstetrics and Gynæcology in New France.

Dr. E. P. Scarlett, Calgary.
Five Against Oblivion.

Dr. Harold N. Segall, Montreal.
The First Clinic-Pathological Case Report of Angina Pectoris Associated with Aortic Valve Stenosis, in a letter from Dr. Wall to Dr. Heberden, May 30, 1772.

Dr. Philippe Panneton, Montreal.
Notes Médicales sur les Indigènes d'Amérique dans les écrits d'Améric Vespus.

Section of Medicine

Wednesday, June 13

Dr. Paul Dumas, Montreal.
Goitre and Thiouracil.

Dr. J. W. McKenzie, Charlottetown.
Pancreatic Cysts with Report of a Case.

Dr. Leopold Morissette, Montreal.
The Diagnostic Value of Blood Smears.

Dr. E. H. Mason, Montreal.
Treatment of Circulatory Diseases of the Extremities.

Section of Obstetrics and Gynæcology

Wednesday, June 13

Dr. Jacques Fortier, Montreal.
Caudal Anæsthesia.

Dr. F. G. McGuinness, Winnipeg.
Forceps Delivery—Indications and Dangers.

Dr. E. M. Robertson, Kingston.
Maternal and Fetal Anoxia with a Consideration of the Possible Remote Effects of Asphyxia Neonatorum.

Dr. W. P. Tew, London.
Avoidable Complications in Obstetrics and Gynæcology.

Section of Ophthalmology

Wednesday, June 13

Wing Commander Kenneth Evelyn, Montreal.
Night Vision.

Dr. Jean Lacerte, Quebec.
Un Cas de Buphtalmie (glaucome infantil) traité par le Sulpharsenamine.

Dr. A. D. Ruedemann, Cleveland, Ohio.
The Use of Beta Radium in Lesions of the Eye.

Dr. Alexander E. MacDonald, Toronto.
New Treatment for Spastic Entropion (lantern slides).

Section of Pædiatrics

Wednesday, June 13

Dr. G. B. Wiswell, Halifax.
The Anæmias of the New Born.

Dr. C. E. Snelling, Toronto.
Jaundice in Infancy.

Dr. Jean Paul Beaudet, Three Rivers.
Treatment of Whooping Cough with Serum.

Dr. Albert Guilbeault, Montreal.
La Vaccination Anti-Tuberculeuse par le BCG.

Section of Radiology

Wednesday, June 13

Dr. G. Pinsonneault, Montreal.
Roentgentherapie au Contact dans les lesions malignes de la bouche.

Dr. C. L. Ash, Toronto.
X-Ray Treatment of Arthritis.

Dr. E. H. Shannon, Toronto.
Observations on the Roentgen Therapy of Embryonal Carcinoma of the Testis.

Surg.-Lieut. Commander J. Bouchard, Halifax.
Oxygen Arthrography of the Knee Joint.

Section of Surgery

Wednesday, June 13

Dr. Edouard Desjardins, Montreal.
Drainage Abdominal.

Dr. O. H. Wangensteen, Minneapolis, Minn.
The Problem of Bowel Obstruction and its Management.

Lieut.-Col. S. D. Gordon, Toronto.
The Late Repair of Burn Deformities (moving pictures).

Dr. Francois Archambault, Montreal.
Ileitis Terminale.

Section of Urology

Wednesday, June 13

Dr. Walter Hogarth, Fort William.
The Suppression of Urine due to Giant Hydronephrosis.

Dr. Jean Paul Bourque, Montreal.
History of French Urology.

Surg.-Lieut. Commander John T. MacLean, Ste. Anne de Bellevue, Que.
Repair of War Wounds to the Bulbous and Membranous Urethra with the Use of Skin Grafts and Penicillin.

Surg.-Lieut. W. E. Collins, St. John's, Nfld.
Prostatitis on the North Atlantic Service.

Dr. Lucien Sylvestre, Montreal.
Penicillin in the Treatment of Gonorrhœa.

ROUND TABLE CONFERENCES

Thursday, June 14

9.00 – 10.00 a.m.

Anæsthesia

Chairman: **Dr. H. Griffith, Montreal.**

Subject: *Interesting Cases.*

Dermatology

Chairman: **Dr. Paul Poirier, Montreal.**

Subject: *Evaluation of Penicillin and other Intensive Methods of Therapy in Syphilis.*

Medicine and Surgery Combined

Chairman: **Dr. C. G. Sutherland, Montreal.**

Subject: *Gastric and Duodenal Ulcer.*

Obstetrics and Gynæcology

Chairman: **Dr. Oscar Mercier, Montreal.**

Subject: *Urinary Tract Infections in Pregnancy.*

Otolaryngology

Chairman: **Dr. G. E. Tremble, Montreal.**

Subject: *Non-surgical Treatment of Sinus Infection.*

Pædiatrics

Chairman: **Dr. A. Goldbloom, Montreal.**
Dr. Paul Letondal.
Dr. J. M. O'Neill.
Dr. F. Shippam.

Subject: *Chronic diarrhœa in Young Children.*

GENERAL SESSION

Thursday, June 14

10.15 a.m.

Dr. John Fraser, Montreal.
The Management of Chronic Pelvic Infection.

Dr. Charles E. Grignon, Montreal.
Treatment of Menopause.

French Guest Speaker.

The Honourable Dr. R. P. Vivian, Minister of Health for Ontario.
The Rôle of Public Health in the Practice of Medicine.

SECTIONAL MEETINGS

2.15 p.m.

Thursday, June 14

Section of Anæsthesia

Dr. R. J. Fraser, Hamilton.
Continuous Spinal Anæsthesia.

Dr. Marian Webster, Toronto.
Intravenous Procaine for Postoperative Pain Relief.

Dr. Gladys Nitikman, Montreal.
Spinal Anæsthesia for Operations on the Vertebral Column.

Section of Dermatology

Thursday, June 14

Dr. J. Adrien Lambert, Montreal.
Vitamins in Dermatology.

Dr. George B. Sexton, London, Ont.
The Use of Aldersone in the Treatment of Neurosyphilis.

Surg.-Lieut. Cmdr. Donald S. Mitchell, Halifax.
Experiences of Penicillin in Dermatitis in the Forces.

Dr. George S. Williamson, Ottawa.
Severe Erythema Multiforme: A discussion of its Etiological Relation to Primary Atypical Pneumonia and a Report of Six Cases.

Section of Industrial Medicine

Thursday, June 14

Dr. Alberic Marin, Montreal.
Industrial Dermatoses.

Dr. F. J. Tourangeau, Quebec.
Appréciation des Problèmes d'Hygiène Industrielle dans la Province de Québec.

Dr. Lucien Brouha, Montreal.
Fatigue in Industry.

Dr. J. G. B. Lynch, Sydney, N.S.
Medical Care in the Coal Mining and Steel Industries of Nova Scotia.

Dr. D. Ewen Cameron, Montreal.
Psychiatry in Industry.

Section of Medicine

Thursday, June 14

Dr. Joseph Kauffman, Montreal.
The Clinical Use of Anti-coagulants.

Dr. F. A. Willius, Rochester, Minn.
The Critical Evaluation of Methods of Diagnosis in Cardiac Disease with Special Reference to Electrocardiography.

Dr. W. R. Campbell, Toronto.
Cardiovascular Disease in Diabetes Mellitus.

Colonel A. B. Walter, Ottawa.
The Weak Back.

Section of Obstetrics and Gynæcology

Thursday, June 14

Dr. John Mann, Toronto.
Important Clinical Aspects in the Treatment of Chorionepithelioma. A series of cases is reported.

Dr. A. E. Trites, Vancouver.
Care of the Gravid Patient.

Dr. Kenneth M. Grant, Halifax.
Puerperal Sepsis (lantern slides).

Dr. Jacques Gauthier, Montreal.
Quelques Considérations sur les Grossesses Ectopiques.

Section of Ophthalmology

Thursday, June 14

Dr. K. B. Johnston, Montreal.
Metastatic Carcinoma of Uvea.

Dr. Jules Brault, Montreal.
Treatment of Glaucoma Secondary to Uveitis.

Dr. Lloyd Morgan, Toronto.
Resection of the Ocular Muscles.

Dr. Henri Pichette, Quebec.
Cranio-Facial Deformations and Muscular Desequilibrium: Strabismus and Heterophoria (motion pictures).

Section of Otolaryngology

Thursday, June 14

Dr. A. O. Freedman, Montreal.
Dr. J. W. McKay, Montreal.
Diseases of the Laryngeal Ventricle and the Tomograph X-Ray.

Dr. Hector Mortimer, Montreal.
The Testing of Hearing of Speech.

Dr. Valmore Latraverse, Montreal.
Bedside Bronchoscopy—a New Position (with moving pictures).

Lieut.-Col. Donald S. McEachern, Ottawa.
Rehabilitation of War Personnel Subjected to Aural Trauma.

W./C. Joseph A. Sullivan, Toronto.
Indications for and End Results of the Fenestration Operation.

Section of Pædiatrics

Thursday, June 14

Dr. F. W. Jeffrey, Ottawa.
Intestinal Obstruction in the Newborn.

Dr. J. A. Toomey, Cleveland.
Lesions about the Eyes in Acute Infectious Diseases.

Dr. H. S. Little, London.
Urological Investigation in Children with Abdominal Pain.

Dr. Alton Goldbloom, Montreal.

Dr. Helen Friedman, Montreal.
Galactæmia.

Section of Radiology

Thursday, June 14

Dr. Albert Jutras, Montreal.

Dr. Francois Badeaux, Montreal.
Roentgentherapy of Inflammatory Lesions of the Eye.

Dr. L. A. Gagnier, Montreal.
Aspect Radiologique d'un Reticulo-Sarcome primitif d'un rein.

Dr. Henri Lapointe, Montreal.
Les Tumeurs du Rein.

Dr. J. W. McKay, Montreal.

Dr. J. E. Pritchard, Montreal.
Diseases of Bone.

Section of Surgery

Thursday, June 14

Dr. Georges Cartier, Montreal.
Peripheral Vascular Disease.

Lieut.-Col. G. A. Holland, Debert.
Varicose Veins.

Dr. S. Jameson Martin, Montreal.
Carcinoma of the Mouth.

Dr. E. M. Cooper, Montreal.
Arterio-venous Fistula.

Section of Urology

Thursday, June 14

Dr. C. A. Cawker, Montreal.
Treatment of Cystine Calculi.

Dr. Norman W. Roome, Toronto.
Treatment with Vitamin B of a Special Type of Vesical Atony.

Dr. S. A. MacDonald, Montreal.
Mortality in Prostatic Adenoma.

Major David Swartz, Winnipeg
The Management of the Neurogenic Bladder in Spinal Cord Injury.

Friday, June 15

ROUND TABLE CONFERENCES

9.00 – 10.00 a.m.

Anæsthesia

Chairman: **Dr. Wesley Bourne, Montreal.**
Subject: *Interesting Cases.*

Medicine

Chairman: **Dr. Keith Gordon, Montreal.**
Subject: *The Treatment of Pneumonia.*

Radiology

Chairman: **Dr. W. L. Ritchie, Montreal.**
Subject: *Roentgentherapy of Inflammatory Conditions.*

Surgery

Chairman: **Dr. Dudley E. Ross, Montreal.**
Subject: *Thoracic Surgery.*

Urology

Chairman: **Dr. Paul Bourgeois, Montreal.**
Subject: *Surgical Treatment of Uretero-pelvic Obstruction.*

GENERAL SESSION

Friday, June 15

10.15 a.m.

Dr. Fred Smith, Montreal.
Penicillin in Surgery.

Dr. Charles Lefrancois, Montreal.
The Surgical Management of Diverticulitis of the Colon.

Dr. John A. Toomey, Cleveland.
The Treatment of Poliomyelitis in the Acute Stage.

Dr. F. A. Willius, Rochester, Minn.
Cor Pulmonale.

CANADIAN ORTHOPÆDIC ASSOCIATION

First Annual Meeting, June 11 and 12, 1945, Salon "B" Mount Royal Hotel, Montreal

(Courtesy of the Canadian Medical Association)

First day, Monday, June 11

Business Meeting.
Dr. J. E. Samson, Montreal, Chairman.

(1) 10.00 a.m.—Members welcomed by
Dr. J. A. Nutter, Montreal.

(2) General Secretary's report.
Dr. J. C. Favreau, Montreal.

(3) Presentation of Constitution and By-Laws.
Dr. J. E. Samson.
Discussion will open.

(4) Elections.

(5) Notice of Motion.

12.30 Lunch will be served in Salon "B".
Guest speaker, Mr. J. A. Duckett, Montreal.
The Stump and the Prosthetist.

Annual Dinner.
Salon "B", (Dinner jacket), cocktails at 7.30.

Tuesday, June 12 — Salon "B"

Scientific Program

Dr. J. A. Nutter, Chairman

9.00 - 9.30 a.m.
Col. R. I. Harris and staff of the Orthopædic Treatment Centre at Christie Street Hospital, Toronto.

(1) **Col. R. I. Harris.**
Nephrolithiasis due to Prolonged Recumbency.

(2) **W./C. H. Coleman.**
The Use of Cancellous Bone Grafts in the Treatment of Bone Defects of the Extremities.

(3) **Major J. Bateman.**
The Technique of Plasma Suture of Peripheral Nerve Injuries.

(4) **Dr. G. M. Dale.**
The Evaluation of End-bearing Amputations.

10.30 - 11.00 a.m.
Dr. Gerald L. Burke, Vancouver.
The Dennis-Browne Method of Treatment of Club-feet.

11.00 - 12.00 a.m.
Dr. J. E. Samson and staff.
Symposium on Back Pain.

(1) **Dr. U. Frenette.**
Congenital Anomalies.

(2) **Dr. R. Gariepy.**
Trauma.

(3) **Dr. Paul Potvin.**
Soft Tissue Lesions.

(4) **Dr. J. E. Samson.**
Arthritis and Rupture of Disc.

12.00 - 12.30 p.m.
Dr. S. E. Goldman.
Fusion of the Adult Hip for Tuberculosis.

Col. R. I. Harris, Chairman

2.00 - 2.30 p.m.
Dr. Andrew MacKinnon, Winnipeg.
The Subastragaloid Joint—a plea for its recognition clinically.

2.30 - 3.00 p.m.
Dr. W. G. Turner.
Osteochondritis of Upper Tibial Epiphysis.

3.00 - 3.30 p.m.
Dr. Antonio Samson, Montreal.
Periarthritis of the Shoulder Joint with coloured moving pictures.

3.30 - 4.00 p.m.
Dr. Joseph M. Murray, Ottawa.
Arthroplasties and Reconstructive Joint Surgery with moving pictures.

4.00 - 4.30 p.m.
Dr. Norman T. Williamson, Montreal.
Epiphysitis of Adolescence.

THE SOCIETY OF OBSTETRICIANS AND GYNÆCOLOGISTS OF CANADA
LA SOCIETE DES OBSTETRICIENS ET GYNECOLOGUES DU CANADA

First Annual Meeting, June 15 and 16, 1945
Premiere Reunion Annuelle, juin 15 et 16, 1945, Salon D, Mount Royal Hotel, Montreal

(Courtesy of The Canadian Medical Association)
(Courtoisie de l'Association Médicale Canadienne)

Friday, June 15
Vendredi, juin 15

2.00 p.m.

Scientific Session Chairman — Réunion Scientifique Président

Dr. Léon Gérin-Lajoie

(1) **Drs. R. T. Weaver and D. L. Adamson, Hamilton.**
Spinal Anæsthesia for Vaginal Delivery—a report of over 1,500 cases.

(2) **Dr. W. G. Cosbie, Toronto.**
Cancer Developing in the Cervix of the Uterus after Supra-vaginal Hysterectomy.

(3) **Dr. Raymond Simard, Montreal.**
Case Diagnostique (case for diagnosis).

(4) **Dr. A. M. Agnew, Vancouver.**
Gestational Neuronitis.

(5) **Dr. J. E. Ayre, Montreal.**
Vaginal and Cervical Cytology in Uterine Cancer Diagnosis.

7.30 p.m.
Annual Dinner (Convention Room).
Guest Speaker (name to be announced later).
(Dinner Jacket).

Saturday, June 16

Samedi, juin 16

9.30 a.m.—Convention Room.

Business Session — Réunion d'Affaires

(1) Call to order.
(2) Reading Minutes of last annual meeting.
(3) Annual report of the Secretary.
(4) Annual report of the Treasurer.
(5) Adoption of Amended Act and By-Laws.
(6) Presidential Address by the retiring President.
(7) Election of Officers.

Notice of Amendment to Constitution and By-Laws

In view of the action of the Government, which during the past year, has abrogated the Department of Pensions and National Health and has replaced that Department with the Department of Veterans' Affairs and the Department of National Health and Welfare, the committee on Constitution and By-Laws recommends that the Constitution be amended as follows:

Article IX—The General Council—Section (f), which now reads, "Two representatives of the Department of Pensions and National Health who are members of the Canadian Medical Association, one of whom shall be the Deputy Minister of Pensions and National Health", be deleted, and that it be replaced by the following:—

Section (f).—"Two representatives from the Department of Veterans' Affairs who are members of the Canadian Medical Association, one of whom shall be the Director General of Treatment Services; also two representatives from the Department of National Health and Welfare, who are members of the Canadian Medical Association, one of whom shall be the Deputy Minister in charge of Health."

Medical Societies

Montreal Physiological Society

The annual general meeting of the Society was held in the Medical Building of McGill University on April 23, 1945.

The program was as follows:

1. On the source of replacing cells and mechanism of replacement of gastric surface epithelium. By Rhoda Grant, Department of Physiology, McGill University.

2. The effect of quinine bisulphate on the parasympathetic innervation of the heart and of the stomach. By B. P. Babkin and T. Ritchie, Department of Physiology, McGill University.

Intravenous administration of moderate doses of quinine bisulphate abolished temporarily the inhibitory effect of faradic stimulation of vagus on the heart in dogs. Physostigmine restored the effect of vagus paralyzed by quinine.

Since the effect of an appropriate dose of mecholyl on the heart was also arrested by quinine it may be supposed that quinine interferes in some way with the action of parasympathetic chemical transmitter on the heart. The same doses of quinine greatly diminished in dogs the gastric secretion evoked by rhythmic faradization of vagus, but they hardly influenced the secretion stimulated by histamine.

3. The preparation and oxidation of artificial "sterols" of the bile acid series. By J. Cohen, R. D. H. Heard, D. K. Lawrence and B. K. Wasson, from the Department of Biochemistry, McGill University, and the Research Laboratories, Charles E. Frosst & Company, Montreal.

R. D. H. HEARD,
Secretary.

La société médicale des hôpitaux universitaires de Québec

Une séance de cette société eut lieu à l'Hôpital Laval, le 6 avril. Ainsi que les résumés des travaux qui y furent présentés.

ERYTHÊME NOUEUX ET TUBERCULOSE. — R. Desmeules et P. Richard.

Les auteurs font l'historique de l'étiologie de l'érythème noueux. La théorie autonomiste fut d'abord acceptée. Puis, on reconnut que l'érythème noueux était un syndrome cutané qui manifestait une allergie apparaissant le plus souvent pendant la tuberculose et occasionnellement au cours d'autres infections. La dermatite contusiforme est principalement une manifestation de la primo-infection tuberculeuse.

Les auteurs rapportent 24 observations: 20 malades souffrirent de tuberculose ganglio-pulmonaire, 2 de tuberculose parenchymateuse et 2 de pleurésie séro-fibrineuse. 58.33% des 24 patients eurent des bacilles de Koch dans les expectorations ou le liquide de lavage gastrique. Une des observations est particulièrement intéressante et démonstrative parce qu'on réussit à mettre en évidence le bacille tuberculeux dans le sang, le liquide gastrique et une parcelle d'un nodule érythémateux.

Il paraît logique de penser tout d'abord à l'étiologie tuberculeuse chez tout sujet atteint d'érythème noueux et de considérer cette étiologie comme vraie jusqu'à preuve du contraire. Les auteurs préconisent la radiographie pulmonaire systématique de tout sujet atteint d'érythème noueux. Les 24 malades observés justifient une telle ligne de conduite.

CONTRIBUTION À L'ÉTUDE DU SARCOME PRIMITIF DU POUMON.—G.-L. Côté.

Le cancer primitif du poumon est aujourd'hui bien connu et tout clinicien se doit de ne pas ignorer cette affection autrefois considérée comme une entité clinique rare. L'auteur rappelle que le cancer primitif du poumon peut se dissimuler derrière les plus divers; que, s'il faut accorder une valeur indéniable aux symptômes cliniques, ceux-ci sont souvent impuissants pour nous aider à porter un diagnostic de certitude. C'est à l'exploration radiologique et bronchoscopique que doit s'adresser le clinicien pour en arriver à un élément de plus grande certitude.

Parmi les formes de cancer pulmonaire, ce sont les cancers épitheliaux qui sont les plus fréquents, et ils se rangent sous trois variétés différentes: épithélioma cylindrique, épithélioma pavimenteux et épithélioma

atypique. Les sarcomes sont plutôt rares, et la littérature n'en renferme que quelques cas isolés. Un fait, cependant, domine toute l'histologie pathologique des cancers pulmonaires: c'est le polymorphisme et l'imprécision de la nature des éléments cellulaires, qui rend difficile la classification de tels cancers.

Suit une observation personnelle de sarcome primitif du poumon.

SUPPURATION BRONCHO-PULMONAIRE ET PNEUMECTOMIE.—P. Roger, J.-M. Lemieux, G.-L. Côté et L. Rousseau.

Il s'agit d'une enfant de 9 ans, présentant de la toux depuis l'âge de 4 ans à la suite d'une coqueluche. Les antécédents tuberculeux de cette malade, les clichés radiographiques la firent considérer pendant longtemps comme une tuberculeuse. Des phénomènes atélectasiques permirent de soupçonner une obstruction bronchique que des bronchoscopies révélèrent due à des dilatations.

Une pneumectomie fut pratiquée chez cette enfant et fut suivie d'une guérison complète. L'examen histopathologique du poumon enlevé montre un lobe inférieur atélectasié contenant de nombreuses dilatations. Le lobe supérieur était le siège de plusiers infarctus que l'on attribue aux manœuvres opératoires.

OBSERVATIONS EN RAPPORT AVEC LA VITAMINE "C" CHEZ DES TUBERCULEUX.—J.-E. Sylvestre et M. Giroux, Hôpital Laval, Ste-Foy, Québec.

Ces observations ne sont qu'une première phase d'un programme d'études entreprises à l'Hôpital Laval, en vue d'établir une méthode qui permette de déterminer d'une façon aussi précise que possible les besoins nutritifs des malades. Ces observations préliminaires ont porté sur 12 personnes tuberculeuses, six hommes et six femmes. Si les méthodes employées ne sont pas d'une précision absolue, les résultats obtenus sont cependant conformes aux conclusions que nombre d'observateurs ont énoncées déjà:

1° Les tuberculeux sont généralement en déficit de vitamine C.

Nos hommes, avant de recevoir un supplément d'acide ascorbique, n'éliminaient que de 9 à 28 milligrammes d'acide ascorbique dans les urines des 24 heures.

2° La plupart des tuberculeux demandent plus de vitamines C pour maintenir l'imprégnation de leur organisme que la majorité des individus normaux.

Chez nos 12 malades, la dose nécessaire au maintien de l'imprégnation varie de 2 à plus de 5 milligrammes par kilogramme de poids.

Les observateurs reconnaissent que la vitamine C exerce une influence favorable sur l'état général et sur certaines complications de la tuberculose, mais il n'est pas démontré que le cours normal des lésions pulmonaires soit changé. Cependant, il ne faut pas attendre de la vitamine C plus qu'elle peut donner. Elle n'est, après tout, qu'un des éléments essentiels nécessaires à la nutrition; aussi, à la lumière des connaissances modernes, bien qu'elles soint encore incomplètes, n'est-il pas plausible d'espérer que la solution complète du problème de la nutrition chez un tuberculeux peut influencer favorablement le cours de sa maladie.

Calgary Medical Society

At the annual meeting of the Calgary Medical Society, held on April 9, 1945, the following officers were elected for 1945-1946: *President*—Dr. H. B. McLeod, *Vice-president*—Dr. A. E. Wilson, *Secretary*—Dr. H. V. Morgan, *Treasurer*—Dr. J. V. Follett, *Librarian*—Dr. R. R. Hughes, *Executive Committee*—Drs. R. C. Riley, E. C. Scharf and Clara Christie.

The Vancouver Medical Association

The annual meeting of the Vancouver Medical Association was held on May 1. Officers elected were: *President*—Dr. Frank A. Turnbull; *Vice-president*—Dr. H. A. DesBrisay; *Honorary Treasurer*—Dr. Gordon Burke; *Honorary Secretary*—Dr. G. A. Davidson.

A very satisfactory financial report was given, and several matters reported on, including the formation of a fund to be known as "The A. W. Bagnall Historical Collection". This will be ear-marked for historical books for the Library, and is a memorial to the late Dr. A. W. Bagnall, who had done so much for the Library.

The meeting was addressed by Professor R. H. Clark, of the University of British Columbia, who gave a most interesting talk on "Plastics".

Mr. Pat Fowler of the Undergraduate Medical Society of the University of British Columbia also addressed the meeting urging immediate action on the formation of a Medical Faculty. He stated that 215 students were now taking pre-medical courses, and that the outlook for completing the medical course was very poor for the majority of them.

The Canadian Anæsthetists' Society

REFRESHER COURSE

June 4-12, 1945

MONTREAL

June 4, a.m.—Dental Clinic, University of Montreal, Montreal General Hospital and Royal Victoria Hospital.

June 4, p.m.—"Analeptics", Dr. K. I. Melville, Ciba Building, 1235 McGill College Avenue.

June 5, a.m.—Hôpital Notre Dame and Homœopathic Hospital.

June 5, a.m.—"Local Anæsthesia for Upper Extremity", Dr. C. P. Martin, Medical Building, McGill University.

June 6, a.m.—Hôpital du Sacré Cœur and Royal Victoria Hospital.

June 6, p.m.—"Demonstration on Respiration", Dr. J. H. Hoff, Biological Building, McGill University.

June 7, a.m.—Hôpital Hotel-Dieu and St. Mary's Hospital.

June 7, p.m.—Subject to be announced, Dr. E. Robillard, University of Montreal.

June 8, a.m.—Hôpital Hotel-Dieu and Montreal General Hospital.

June 8, p.m.—Anæsthesia film, Ciba Building, 1235 McGill College Avenue.

June 9, a.m.—Hôpital Ste. Justine and Children's Memorial Hospital.

QUEBEC CITY

June 11 and 12—Clinical anæsthesia at local hospitals under the direction of Captain B. Paradis, Quebec Military Hospital.

June 13, 14 and 15—Anæsthesia Section of Canadian Medical Association.

Special Correspondence

The London Letter

(From our own correspondent)

THE HEALTH SERVICE

The rather curious position with regard to the Health Service negotiations has been discussed in Parliament both with heat and misunderstanding, and newspapers have vied with each other in various surmises as to what in fact are the alternative proposals now before the profession for their consideration. The Minister of Health carefully explained last month that the Government had in fact conceded nothing yet, but the discussion in Parliament did make it clear that there was a certain amount of dissatisfaction with the slowness of progress.

Consultants have been having meetings and again although no revelations have been made, reports show that they are not satisfied with the powers given to what are termed regional councils, a form of organization which did not appear in the original White Paper.

Meanwhile, in preparation for the special meeting of the B.M.A., the profession is being asked to make up its mind not only on the White Paper alternatives but also as to whether the Health Service is to be made available for the whole population or with a section excluded. A relatively minor point is the terminology to be used in the future when there are no longer panel patients, and it would be very unfortunate if any phrase was used suggesting that patients treated under a new service were in any way different from private patients as now understood.

Whereas some years ago when discussions first started, the plea was constantly being made that nothing should be done until doctors came back from the Forces, today we are being told in some quarters that we have been very remiss in not having a complete Service ready for the doctors who come back. It is clearly very hard to please everybody.

EUROPEAN VICTORY AND AFTER

This whole question of release from the Services is much under discussion. Medical officers of the armed Forces are inclined to feel very bitter about those who have been in the Emergency Medical Service, and this particularly applies to the younger men holding the registrar type of job.

It has been suggested that with the end of major hostilities in Europe, some sort of exchange might be possible, but although it would be a relatively simple matter to train the E.M.S. doctor to take up a Service job, it would not be quite so easy the other way round, and in any case there is the difficulty that it would mean some sort of priority release for doctors. The general plan for demobilization according to age and length of service is supposed to be universally applied throughout all the Services and there might well be difficulties if exceptions were made.

Nevertheless all of us who have remained at home (and it should be clear that the choice has never been a personal matter) feel very strongly that everything must be done to help men in the Services when they do come back. The Government's plan for postgraduate training has just been released and includes resident posts, refresher courses and posts of the registrar type, according to previous experience and needs of the Service Medical Officers.

DECLINE IN DIPHTHERIA

Despite the war, the campaign for immunization against diphtheria has gone well and recent figures are beginning to show quite dramatic effects. The first quarter of the year is generally a bad time for diphtheria but in 1945 the number of cases notified has not only shown an absence of any seasonal increase, but is actually lower than the summer quarter of last year, which in turn was the lowest level since notification was begun.

The actual figures are less than half of what they were 4 years ago. The fatality rate has also fallen. The decrease has not been uniform throughout the country, having been better in the south, and it may be that certain rather severe local outbreaks in the north may be due to pockets of non-immunized children.

ALAN MONCRIEFF.

London, May 1.

Miscellany

Small Town Medical Practice

It is becoming increasingly difficult to persuade a young graduate to enter practice in a small town. All his training has inculcated firmly in his mind that it is not possible to practice medicine without all the facilities which populous areas afford. Perhaps, medical schools are responsible for that attitude. They have not done much, if anything, to develop in the student a strong spirit of self-reliance, the feeling that he can practice good medicine in keeping with present day standards by depending solely on himself. There are many practitioners in very small communities who are doing an excellent job. They are well equipped; they are competent; self-reliant—as they must be if far removed from a fellow practitioner. They have an x-ray apparatus; an electrocardiograph; a metabolimeter; a well equipped clinical laboratory. True, they must be able to make good use of all this and they are. They must depend on such help, if needed,

as they can secure in the community, an ex-nurse; the druggist; any one with sufficient intelligence and willingness to be helpful. The life is not an easy one, but the financial returns are good, often much better than are those of a young practitioner in a large city. And, there is the satisfaction of doing a good job where it is needed.

In order to give the medical student an insight into what such a practice is, would it not be a good plan to give every senior student one month of experience with a carefully chosen practitioner in a small community? Such an experience should go far to convince the student that a small practice is a good practice. And it would go far to bring about a more equable distribution of physicians on the basis of actual need for medical service. It is not unusual to see a small, well equipped hospital of ten or fifteen beds in a community of less than 300 people. People are ready and willing to help set up a small hospital if they are convinced that the physician can make the right use of it. It can be done. It has been done in many places. Graduates know little, if anything, about the possibilities of practice in a small community. They do not have opportunity to find out what it is. They work in hospitals; meet only city practitioners; get the feeling and conviction that it is not possible to practice without all the facilities they see and use day after day, including the nearness of fellow practitioners. Assigning them to a country practitioner of proved worth for one month will give them the other side of the picture and this may induce them to practice in a small community. Without that experience, the thought of being alone, with the nearest practitioner 50 or more miles away, is appalling. Self-reliance, independence, strength of will and character can and must be developed in medical students if some, at least, of the problems besetting medical practice today are to be solved.—*Journal of the Association of American Medical Colleges,* April, 1945.

NETHERLAND CHILDREN IN ENGLAND

J. Tauber, M.D.(Prague), U.N.R.R.A.

Four hundred and ninety-six Netherland children reached this country on February 11, 1945, and were accommodated in a large hostel in Coventry formerly occupied by immigrant munition workers. Preparations for their reception had been made some time in advance. We had little previous knowledge of the condition of the children except that they had been living for a long time mainly on bread, potatoes, and cabbage, and that in this first contingent there were to be no severe or hospital cases.

There is little practical information in medical literature about the feeding of malnourished, weakened, but not really sick persons. It was known that persons who have had practically no fat in their diet for years become very sensitive to it, and that they are liable to react to fat with severe gastric disturbance. In "feeding up" a large group of children, with only a short time available for treatment, it is nevertheless essential to ensure that the fat content of the diet is not kept too low. It is necessary to find the optimum level of tolerance. "Carbohydrate poisoning" is a term that has been used to describe the effects of the type of diet these children had had. It was decided to limit the initial daily fat intake to 50 grams per child and the initial daily carbohydrate intake to 400 grams (to include 250 grams of bread). The first menus, however, were prepared with an initial daily fat intake of about 28 grams.

The children were mostly between 7 and 15 years of age: three were 16 years old. On arrival they presented a somewhat different picture from that expected. The main feature of the malnutrition was not so much wasting as the general undersize. Pallor was notable, and many children were rather weak. The apparent age of many children was well below the actual age. Gross symptoms of avitaminosis were not found. Some children had local thickening, cracks, or dryness of the skin. No trophic changes of the nails were observed and no diseases of the hair. Some 5% of the children had somewhat swollen gums. The dental state in general was not unsatisfactory.

The children's clothing was old, worn, and torn. Their shoes were in a worse state. Several of the children had dresses and suits made from Army blankets given them by soldiers of the liberating armies. Many had all-wooden clogs only. Their socks were very ragged. Within 24 hours the Women's Voluntary Service had started the distribution of complete outfits of new clothing (including handkerchiefs, towels, face-towels) supplied by the Red Cross. It was most pathetic to see the children's pleasure with their new belongings.

Despite the severe shortage of soap on the Continent, the children were very clean on arrival: care had been taken of this before they left the Continent, and the few cases of infestation with lice as well as cases of scabies were treated.

The amount of food was increased each week as tolerance was established. At first many children complained of hunger, which is not surprising. The initial diet had a daily calorie value of 1,800. This was increased on the third day to 1,900, on the fourth to 2,000, on the fifth to 2,200, and at the end of the first week was 2,400 calories. It was difficult to control the diet strictly because well-meaning visitors to the hostel gave sweets, biscuits, and cakes

to the children unknown at the time to the authorities.

Acute gastric disturbance occurred in 17 cases during the first week, 27 in the second week, 24 in the third, and only 7 in the fourth. Most of the cases were easily controlled, although 4 cases developed jaundice. Sores on the feet and hands and impetigo were the commonest visible lesions. It was noticed that many cuts and wounds had turned septic. There were 5 cases of bronchitis and 6 of nocturnal enuresis.

The approximate average gain in weight of the children is shown in the accompanying Table.

GIRLS

	7-8 yrs.	9 yrs.	10 yrs.	11 yrs.	12 yrs.	13 yrs.	14 yrs.	15-16 yrs.
	lb. oz.	lb. oz.	lb. oz.	lb. oz.	lb. oz.	lb. oz.	lb. oz.	lb. oz.
During—								
1st week..	0 15	3 15	3 1.8	1 13.1	2 0	1 12	1 3	2 10.7
2nd week.	2 14.4	0 12.7	1 9.1	1 8.5	1 1.5	2 0	2 8	2 1.1
3rd week.	0 6.7	1 10	1 2.6	1 8.4	1 8	0 14	2 3	1 14.2

BOYS

	7-8 yrs.	9 yrs.	10 yrs.	11 yrs.	12 yrs.	13 yrs.	14 yrs.	15-16 yrs.
	lb. oz.	lb. oz.	lb. oz.	lb. oz.	lb. oz.	lb. oz.	lb oz.	lb. oz.
During—								
1st week..	—	0 5.3	1 13	1 1.5	1 3	2 1.6	1 6.4	1 5
2nd week.	—	2 0	1 6.4	1 14.5	2 5	1 11	2 3	0 6
3rd week.	—	0 14	1 0	2 6.4	0 5	1 1.6	1 6.4	1 4

While living in occupied Holland the children—the older ones at all events—had often been encouraged by the parents to defy German authority and to perform small acts of sabotage—such as, for example, the puncturing of tires of enemy military vehicles. When transferred to the hostel in England the children suddenly found that law and order had to be observed, and at first they found the change somewhat bewildering. During the first week or so "sabotage" tendencies were noted in a few boys of the 13 to 15 years age group. All soon conformed happily to the necessary routine and rules of hostel life.

The first contingent of Netherland evacuee children on the whole presented few difficulties. The main problem was to determine and control the diet, and to graduate it according to growing tolerance. An interesting but lesser problem was the disciplining of the older children, who had for long cultivated disobedience to the German authorities in occupied Holland. —Reprinted from *The British Medical Journal*, April 7, 1945.

Sale of Benzedrine, etc.

A recent amendment to Regulations under the Food and Drugs Act requires that the following drugs may not be sold to the general public except on prescription by a duly qualified physician or dentist:

Beta-amino-propylbenzene (alpha-methyl-phene-thylamine, Benzylmethyl-carbinamine, desoxy-nor-ephedrine) and its salts and derivatives, including isomyn, amphetamine, benzedrine, methedrine, pervitin and their salts.

"Your Constitution's Down"

[*The following lyrical outburst, which appeared in the St. John's "Evening Telegram", should be read in the light of the Nutritional Survey of Newfoundland which appeared in our March issue.*—EDITOR.]

(To the tune of Kelligrew's Soirée and dedicated to the memory of the Nutrition Survey report)

We were just a little worried, when Dad without a smile
Said, "Come and gather round me, your attention for a while;
No more white-bread for Granny, from now on she'll eat brown,
For I see here by the paper that her constitution's down."

CHORUS

Shun screech, wet feet, don't forget to clean your teeth,
Beer in moderation, stay in after tea,
Fish and brewis we must refuse for whole wheat grains and citrus foods,
The one sure way to vitalize with A, B, C, and D.

"Now, Junior, next time you 'fall in', best come home on the run,
Don't stand around in dripping clothes to watch the 'swoilin' guns;
You've never had a cold, 'tis true, but Mom's scared you will drown,
For you're mentally deficient and your constitution's down.

" 'Tis time to give up dancing and to catch up on your sleep,
Be sure to dress up warmly, wear goloshes on your feet;
Exercise all caution, take short strolls through the town,
But be sure to take it easy 'cause your constitution's down.

"I'm going to tell your Grandpa, who has just turned eighty-four,
That he mustn't haul the cod-trap or cut firewood anymore,
He might get the rheumatics, but he won't be muscle-bound,
For you don't develop any when your constitution's down."

It's surprising they're alive at all, those young men from the Bays,
Who go with bare heads, open shirts, on frosty winter days;
No doubt they'll change their tactics, for Dad says that it's been found,
They're just a batch of invalids with constitutions down.

Then Dad he got excited and said it could be bluff,
He raved and told us frankly that his blood-pressure was up;
Mom calmly sat him on a chair and trying hard to frown,
Said, "It's just another symptom that your constitution's down." C.W.R.

Abstracts from Current Literature

Medicine

Treatment of Subacute Bacterial Endocarditis. Kelson, S. R.: *Ann. Int. Med.*, **22**: 75, 1945.

In a large series of cases sulfanilamide, sulfathiazole, and sulfadiazine, at times gave transient benefit, but resulted in no recoveries. Sulfapyridine reduced the fever in a majority and frequently rendered blood cultures negative, but cured only four of 197 patients. Neoarsphenamine, the sulfonamides, together with intravenous typho-paratyphoid vaccine, or with hyperthermia, and various other measures gave no lasting help.

The use of heparin in combination with chemotherapy is stressed. Heparin has been beneficial only when sulfapyridine or a related drug reduced the temperature to normal or near it, and sterilized the blood stream. Decreasing the blood coagulability during a period of such antibacterial effect has almost regularly resulted in recovery, it is claimed.

Penicillin can reduce the temperature and sterilize the blood in cases of subacute bacterial (streptococcal) endocarditis, but on discontinuing the drug, fever and bacteræmia have recurred in all but two of such patients reported to date.

Substituted for sulfapyridine in the heparin-chemotherapy method, penicillin was partially effective in a personally-treated case, but pleomorphic streptococci persisted on all the cultures plates, these disappeared with supplemental sulfadiazine and the patient has remained well since completing the 10-day course of treatment in November, 1943.

The author feels that penicillin excels sulfapyridine in its low toxicity and lesser tendency to induce drug fastness, but further data are needed to evaluate its effectiveness, to determine the best plan of therapy, and to learn if unlike sulfapyridine, penicillin can alone result in a high proportion of successes, and if accompanying it also, the use of heparin is advantageous.

S. R. TOWNSEND

Fibrositis of the Back. Copeman, W. S. C. and Ackerman, W. L.: *Quart. J. Med.*, **13**: 37, 1944.

Fibrositic pain in the back generally has its origin in certain focal "trigger" points from which the more generalized subjective pain is referred according to segmental plan. A chart was prepared from a large number of patients which showed that the great majority of these trigger points occurred in the following areas. In the dorsal region they were found over the supraspinatus tendon, over the sacrospinalis muscle in each interscapular region and along the medial border of the scapula from the spine downwards. In the lumbar region the most common sites are the edge of the sacrospinalis; just above the iliac crest and at the level where the latissimus dorsi crosses the sacrospinalis. In the gluteal region tender points may be found all along the iliac crest and for two inches below it; also along the sacro-iliac junction.

Fourteen backs were dissected and a pattern of fat was discovered in the areas described above. This "basic" fat pattern was present even in cachectic bodies where practically all other fat had disappeared.

Biopsies were performed on ten patients and at the painful spots herniation of fat through over-lying fibrous tissue was found. Removal of this herniated fat resulted in clinical cure of fibrositis.

The authors are of the opinion that these so-called fat herniæ are the pathological basis of many cases of fibrositis.

NORMAN S. SKINNER

Surgery

Early Repair of Neural Wounds with Penicillin Therapy. Norcross, Commander N. C., (M.C.), U.S.N.R.: *Arch. Surg.*, **50**: 67, 1945.

Twelve patients with neural wounds were treated in a large base hospital within a few days to four weeks after injury. The decision whether surgical interference is necessary during this early period is difficult to make and a thorough knowledge of the physiology of the nerve and of the clinical manifestations of disordered function is of paramount importance.

Because some of the patients complained of severe pain, it was decided to give them penicillin therapy, and to operate on them shortly after their admission to hospital, in spite of infection. Two groups were treated in this way: men whose wounds were healing by primary intention without infection and men whose wounds were still open and showed varying degrees of infection.

In those patients with apparently clean wounds, penicillin was given for two days before operation and for six to eight days afterward in doses of 10,000 units intramuscularly, every three hours. To those patients with unhealed wounds, penicillin was given for four days, and for ten or more days after operation, in doses of 20,000 units every three hours.

Seven of the series had neurolysis and four anastomoses performed. One had scar tissue removed from around the right sciatic nerve in the posterior thigh, following injury by a metal fragment. All wounds healed by first intention without complications.

G. E. LEARMONTH

The Use of an Identifying "T" Tube in the Common Bile Duct in Gastric Resection for Duodenal Ulcer Adherent to the Bile Ducts. "L'introduction dans le cholédoque d'un tube en 'T' facilement identifiable, au cours des résections gastriques pour ulcère duodénal adhérant aux canaux biliaires." Lahey, Frank H.: *Surg., Gyn. & Obst.*, **80**: 197, 1945.

Ayant pratiqué plus de 500 gastrectomies sub-totales pour ulcère duodénal, l'auteur est convaincu que le facteur principal de mortalité réside particulièrement dans les rapports entre l'ulcère duodénal et le cholédoque, surtout à son point de pénétration dans le duodénum.

Les ulcères duodénaux situés sur la paroi postérieure ou latérale du duodénum ont tendance à adhérer au cholédoque ou à envahir les canaux biliares et le pancréas. Le danger, au cours d'une gastrectomie subtotale, est d'atteindre l'ampoule de Vater, en réséquant le duodénum et les parties induées de l'ulcère qui adhèrent au pancréas, ou aux canaux biliares et pancréatiques.

L'auteur trouve avantage à introduire dans le cholédoque un tube en "T", traversant le sphincter d'Oddi, qui sert à repérer constamment le cholédoque et son point de pénétration dans le duodénum. Ce procédé s'est montré particulièrement utile dans les cas d'ulcère duodénal induré bas situé. Le tube en "T" est introduit après ouverture du canal et dilatation du sphincter d'Oddi aux dilatateurs Bakês et la branche inférieure du tube étroitement suturée au cholédoque. Le chirurgien pourra de la sorte vérifier constamment les rapports entre l'ulcère et le cholédoque et leur point de contact à tous les temps de l'opération. Ce procédé évitera de recourir à des techniques chirurgicales moins satisfaisantes, comme la gastro-entérostomie avec exclusion, par exemple.

L'auteur n'entend pas généraliser l'emploi du tube en "T" à tous les cas de gastrectomie sub-totale, mais le réserver uniquement aux cas cités plus haut.

PIERRE SMITH

Plastic Surgery and Burns

Selection of the Time for Grafting Skin to Extensive Defects Resulting from Deep Thermal Burns. McCorkle, H. J. and Silvani, H.: *Ann. Surg.*, **121:** 285, 1945.

Deep burns should be covered with skin grafts at the earliest opportunity. It is usually unwise to wait for small viable epithelial islands to spread over the raw area. Early grafting avoids the period of debilitation associated with the presence of large granulating areas several weeks after a severe burn. Maintenance of nutrition, particularly protein and vitamin C requirements, is essential if early skin grafting is to be done. Invasive infection must be controlled before grafting.

The optimum time would appear to be between the fourteenth and twenty-first days after burning. Sloughs may be eliminated by chemicals (Dakin's solution), by enzymes, by pyruvic acid, or by surgical excision. Such excision should be done in the operating room, preferably between the third and fourth week. General anæsthesia is necessary. Blood loss at operation must be controlled. Injury to viable tissues must be avoided. Occasionally it may be necessary to graft the area a few days after the excision. Free grafts of intermediate thickness are fixed in place with cotton sutures. It may be necessary, if available donor sites are insufficient, to cut the grafts into "postage-stamps". In children, and in adults with burns near joints, a light plaster covering may be placed over the compression dressing. Dressings are left in place for 2 weeks.

Burns so treated by the authors averaged six and one-half weeks' hospitalization. Early skin grafting minimizes contracture and deformity. Some patients will require plastic correction later. Early closure of burn wounds permits earlier plastic repair.

The Influence of Local Treatment of Burns on Liver Function. Saltonstal, H., Walker, J., Rhoads, J. E. and Lee, W. E.: *Ann. Surg.*, **121:** 291, 1945.

Functional changes in the liver in burned patients were studied. The liver function tests used were the van den Bergh, the bromsulphalein retention test, the hippuric acid conjugation test, and the cephalin flocculation test.

Serum bilirubin levels were higher in patients treated by tanning methods than in those treated by open methods, and highest in those treated with tannic acid. There can be little doubt that tannic acid is absorbed sufficiently to increase hepatic damage. Other tanning methods cause more disturbance of liver function than the non-tanning methods. Some degree of hepatic damage is the rule in burns. It is usually a minor part of the picture.

The mortality of the untanned group was 33.7%; for the tanned group 20.7%. No patient with a burn less than 40% died after tannic acid therapy with one exception (septicæmia). No patient has survived a 40% burn since abandoning tannic acid, in this series.

The abandonment of tannic acid has not resulted in a decrease in mortality in this group. It seems unlikely that the increase in liver damage in tannic acid treated patients is of great significance in the mortality of burned patients. Hepatic damage is probably not the primary cause of death in burn toxæmia.

Obstetrics and Gynæcology

Cervical Pregnancy. Studdiford, W. E.: *Am. J. Obst. & Gyn.*, **49:** 169, 1945.

Cervical pregnancy is a definite, though rare entity. Many cases may be unrecognized. Such pregnancies are rarely carried beyond the twentieth week of gestation. Usually it is necessary to intervene surgically before the end of the fifth month because of hæmorrhage, rupture of the amniotic sac, or perforation of the cervical wall. Profuse and violent hæmorrhage accompanies the attempt to remove the placenta.

Enlargement and expansion of the cervix accompanied by bleeding in the early months of pregnancy, and the detection of the corpus uteri surmounting the cervical mass should be regarded as suggestive of this condition.

Supravaginal rupture of the cervix should be treated by prompt and radical surgery. Intravaginal rupture of the cervix can sometimes be treated more conservatively; however, this complication may require cervical amputation or complete hysterectomy to control hæmorrhage.

When perforation is not present, in most instances the placenta can be evacuated; partially or completely, either manually or instrumentally; the hæmorrhage can be controlled by packing.

Blood for transfusion should be available in quantity to combat the large blood loss which may be expected in cases treated by placental removal. With the use of large and repeated transfusion, it is believed that the need for radical operation of this condition can be sharply reduced. However, on the rare occasion when such a pregnancy progresses beyond the fourth month, complete hysterectomy may well be the safer approach.

ROSS MITCHELL

Carcinoma Corporis Uteri in Two Sisters Aged 34 and 32. Purdie, A. W.: *Proc. Roy. Soc. Med.*, **37:** 426, 1944.

The familial incidence of cancer of the body of the uterus offers even more impressive support for the genetic basis of cancer than does the familial incidence of cervical cancer, since the former type is encountered so much less often. In the family reported by Purdie, the mother had died at 68 of cancer of the rectum. Her two brothers had died in their 60's of cancer of other organs. This woman had 10 children, one dying in infancy, 6 whose sex was not given, and 3 daughters, two of whom had cancer of the body of the uterus at 32 and 34 respectively. This early age of onset is significant also, because the average age of onset of cancer of the body of the uterus is 56 to 58. The third daughter had a benign tumour of the uterus.

MADGE THURLOW MACKLIN

Treatment of Amenorrhœa with Combined Anterior Pituitary Follicle-Stimulating Hormone and Chorionic Gonadotrophin. Davis, A., M.D., Ch.M., F.R.C.S.: *J. Obst. & Gyn. Brit. Emp.*, **51:** 401, 1944.

In synapoidin, we have a preparation considerably superior in action to previous therapeutic combinations. Its chief value value is in the treatment of amenorrhœa of pituitary origin, but it has a definite, though less certain action in other types. Unfortunately absolute differentiation of the various causes of amenorrhœa by ordinary clinical and laboratory methods is by no means certain, so that paradoxical results are common, and until a clearer diagnostic technique is available it is justifiable to use the drug more or less indiscriminately in these cases. It cannot, however, be too strongly emphasized that it should be employed only after the most careful general examination has failed to reveal gross abnormalities of the type discussed above, and such examination must be repeated frequently throughout the course of treatment to control ovarian hypertrophy. In addition, hæmorrhage, however slight, is an absolute contraindication to continuance of the treatment.

N.B.—Dosage used was 1 c.c. (15 "synergy rat-units") in all cases, given intramuscularly 3 times weekly for 3 weeks, providing hæmorrhage did not supervene or that the ovary did not enlarge unduly during the administration.

P. J. KEARNS

Transplantation of the Ureters for Fistula. Roberts, M.: *J. Obst. & Gyn. Brit. Emp.*, **51:** 519, 1944.

A series of 90 cases is presented of obstetrical vesico-vaginal fistula treated by ureterocolic anastomo-

sis with an operative mortality of 14.4%. The methods used are briefly described and their results analyzed. The transplantation of one ureter at a time by the simplest technique has produced the best results. A follow-up has not been possible. The surgeons responsible for the treatment of these cases were Mr. C. V. Braimbridge, M.V.O., F.R.C.S., Surgical Specialist, Kenya. P. J. KEARNS

Neurology and Psychiatry

The Study of the Patient from the Psychosomatic Standpoint. Tillotson, K. J.: *New Eng. J. Med.*, **231:** 753, 1944.

Emotional problems or frank psychiatric disorders constitute 40 to 60% of medical problems in peacetime and this percentage is increased during the stress of war. Trained psychiatrists are few (2% of the medical profession) and the burden of treatment rests upon practising physicians.

The patient should be given an insight into the cause of his symptoms. He must be shown that nervousness and emotional tension result from conflicts and frustration. In some cases this is relatively easy, in many others it is extremely difficult. Many psychoneurotic patients are highly intelligent, they can see the surface of the problem, its ramifications and implications, yet cannot resolve it.

A psychoneurosis is not a matter of logic and is not amenable to any amount of intellectualization. Adjustment is not generally possible, not simply because of the difficulty in discovering and resolving hidden conflicts but also because of the frequent impossibility of altering social and environmental factors. If, however, the basic personality cannot be changed, understanding of the true nature of the illness may bring relief.

Treatment must be directed to the individual problems of the patient and should reckon with his special personality profile. Many of these patients must be dealt with on a symptomatic basis while the deeper psychological factors are being explored. If employment is cut off it must be replaced by a program of occupational therapy or physiotherapy and exercise, unless a period of rest and heavy sedation may be indicated. As a rule drugs are best avoided.

The psychosomatic approach must taken into consideration the fact that the patient is a human being, possessed of all human emotions, and with the psychological means of unconsciously converting these emotions into physical symptoms. It must also be remembered that psychological factors complicate all physical illness and must be considered in the treatment of all organic disease.

Cure of acute psychosomatic symptoms may be brought about by "narcosynthesis". Narcosis is brought about by the use of pentothal sodium intravenously and the patient re-experiences the intense emotions that brought about his psychoneurosis. Psychotherapy is employed while the patient is still under the influence of the drug. In the actual psychoses electric-shock therapy is definitely beneficial.
NORMAN S. SKINNER

Oto-Rhino-Laryngology

Drainage of the Accessory Sinuses in Man. Hilding, A. C.: *Ann. Otol., Rhinol. & Laryngol.*, **53:** 35, 1944.

The author's findings have been noticed in experimental animals and fresh human necropsy subjects. In general, each frontal and ethmoidal sinus exhibited a spiral manner of drainage similar to that in the frontal sinus of the dog. The spiral was directed anteriorly and inferiorly across the anterior wall and floor to the ostium. In each sinus (frontal, sphenoid, maxillary), the same movements of dots of India ink upon the mucous membrane have been observed from the deeper portions of the cavity, laterally up and anteriorly across the lateral wall, then medially across the anterior wall to or upward to the ostium; some crossed the roof just before reaching the ostium. In no specimen was the ink observed to pass out through the artificial window. Obviously, if a large mass of secretions were present, it would flow out through the window by gravity into the inferior meatus and, by ciliary action, be carried posteriorly into the pharynx.

Rationale of sinus irrigation.—If the sinus is filled with creamy pus and the mucous membrane entirely destroyed, the removal of the pus has the same beneficial effects that it has in other abscesses. Usually the lining mucous membrane is not entirely destroyed; by means of its ciliary activity, this membrane drains the sinus of the normal thin film of mucin about every 15 minutes.

When the amount of the secretions is sufficiently increased, the film becomes so deep that when the cervical walls are reached, only the deepest portions of the film next to the tips of the cilia go on through the ostium, while the superficial portions of it slide back to the bottom of the cavity by gravity. The secretions may accumulate until the cavity is full. The volume need not become very great before the cilia are many hours behind in their activity of keeping the cavity empty. If the accumulation of secretion can be removed by irrigation, the deleterious effects, whatever they may be, are avoided, and the cilia are relieved of a great many hours of labour and given a fresh start. If they are not given this help, the destruction may become sufficiently great to allow the infection to become chronically established.
V. LATRAVERSE

Summary of Some Known Facts Concerning the Common Cold. Hilding, A. C.: *Ann. Otol., Rhinol. & Laryngol.*, **53:** 444, 1944.

The author's meaning of the common cold is that widespread, mild, afebrile, epidemic rhinitis occurring principally during autumn and spring months. It is characterized by copious, thin, mucinous, nasal discharge and a self-limited course of two or three days, which is often followed by or complicated by suppurative infections of the nose, sinuses, ears and throat and lower air passages. It is now well established that the etiological factor is a filterable virus. Shibley *et al.* demonstrated that the virus promotes the growth of pathogenic organisms in the throats of patients with colds. Chilling and wetting associated with sudden temperature changes are definite factors in causation of colds probably because of prolonged reduced temperature in the nasal mucosa.

The disease is largely spread by droplet infection and can be controlled by isolation like other communicable diseases. The local pathology consists in destruction of the superficial cells; indeed large numbers of living ciliated cells are found floating in the secretion. The cellular infiltration of the submucosa is largely composed of mononuclear cells, polymorphonuclears and some eosinophiles. The œdema soon decreases but the cellular infiltrate increases; granulocytes and macrophages increase in number as the purulent stage develops. No bacteria were found in the epithelium or submucosa, only in the secretion. The author found that the lytic power of the secretion was reduced at the onset of symptoms and increased again just before improvement began. Cahn-Bronner found that the lytic power was not reduced in the secretion of hay fever and that the change in colds is not a dilution phenomenon. The pH was slightly increased during the acute stage of watery discharge and slightly reduced during the purulent stage; the change in pH is small and tends toward the alkaline side.

Vaccination by bacterial vaccines both by mouth and subcutaneous route appears to be valueless for reducing either the incidence or severity of colds; nasal spray has a scientific basis in the fact that immunity may be local. The immunity following an attack of coryza lasts only 3 or 4 weeks. Vitamins and so-called "hardening processes" are unsuccessful. McCord and McConnell

demonstrated that air-conditioning does not modify the incidence of coryza. But purification by aerosols, antiseptic chemicals or by ultra-violet light seems to be very promising. Codeine and papaverine can have some value in shortening the course. Steaming often gives symptomatic relief.

The sulfonamides have negative results except in the prevention and treatment of complications. Isolation should be practised whenever feasible. In the author's experience, simple ephedrine in saline solution seems to give about as much relief from nasal obstruction as anything else. As soon as there is any sign or symptom of an approaching cold, his patients are instructed to block the nostril (or nostrils) with clean cotton, tightly enough to reduce materially the inflow of air; the cotton must be changed frequently. By this simple measure, the irritation was greatly reduced and often the swelling did not become great enough to obstruct the air passage.

Very often cilia are largely destroyed, then stimulation (obtained by alkaline solution which contains Mg and K salts) would seem to be irrational; acids, on the other hand, paralyze ciliary action. V. LATAVERSE

Orthopædics

Osteotomy of the Spine for Correction of Flexion Deformity in Rheumatoid Arthritis. Smith-Petersen, M. N., Larson, C. B. and Aufranc, O. E.: *J. Bone & Joint Surg.*, **27**: 1, 1945.

This paper describes in detail the procedure of lumbar osteotomy for angulation of the spine. A midline incision is made over the lumbar spinous processes with subperiosteal reflection of the ligaments and muscles. A dry field is essential. After removal of the spinous processes the periosteum is reflected from the superior and inferior articular processes exposing the intervertebral notch. The ligamentum flavum is removed and an oblique osteotomy through the superior and inferior articular processes of the vertebræ is performed. The head and foot of the operating room table are then slowly raised producing closure of the spaces thus formed. After closure of the wound a plaster jacket is worn for six weeks. Then a brace is fitted and worn for two years during which time exercises must be given. Overcorrection must be avoided owing to the compensatory curves in the cervical and thoracic regions which may be present. In all six cases have been operated on with satisfactory results. GUY H. FISK

Osteochondritis Dissecans of the Supratrochlear Septum. Morton, H. S. and Crysler, E.: *J. Bone & Joint Surg.*, **27**: 12, 1945.

Osteochondritis dissecans of the supratrochlear septum has not previously been described. Until seven years of age the bony plate is always present but after this age in certain individuals it absorbs to form the supratrochlear foramen. The frequency varies with the race varying from 4.2% in white Americans to 58% in American Indians. In patients developing osteochondritis dissecans of this bony plate the symptoms are recurrent elbow pain with tenderness above the tip of the olecranon or in the antecubital space. There is limitation of both flexion and extension of the elbow. If the ossicle becomes a loose body in the joint then locking may occur. Attacks may subside spontaneously. The x-ray shows the presence of the necrosis quite clearly. At operation a bony button can be readily lifted out. No cause for the condition other than excessive activity of the elbow in some cases was found. GUY H. FISK

Roentgenology

Meckel's Diverticulum. Mottram, M. E. and Garland, L. H.: *Am. J. Roentgenol.*, **53**: 142, 1945.

Meckel's diverticulum occurs in about 2% of the population. It varies greatly in size, shape and location. The larger diverticula apparently tend to produce symptoms, principally those of intestinal bleeding, attacks of colicky pain localized about the umbilicus, and vomiting. The diverticulum frequently occurs at a greater distance proximal to the ileocæcal valve than is thought probable (*e.g.*, a distance of 60 cm. as in the case reported herewith).

The finding of a collection of barium in the mid or lower ileal area, which fails to conform to the usual pattern of the small bowel or which persists after the small bowel is empty should suggest the possibility of the lesion. Most of the reported cases of Meckel's diverticulum diagnosed roentgenologically have been of fairly large size, or have been suspected clinically and carefully searched for. Some of them have been associated with ulceration, obstruction or tumefaction.

The lack of uniformity in the location and size of the diverticulum, and the fact that at times it is filled with non-opaque material may render the roentgen diagnosis very difficult. R. C. BURR

Roentgenographic Demonstrations by Tantalum Powder of Sinuses Resulting from Extraction of Intervertebral Disc Protrusions. Graf, C. J. and Hamby, W. B.: *Am. J. Roentgenol.*, **53**: 157, 1945.

Following removal of protrusions of lumbar intervertebral discs, the resulting sinuses have been visualized by roentgenography, with tantalum powder as an opaque medium.

The sinus appears as a rather narrow defect extending toward, and in some cases to, the anterior part of the annulus fibrosus. No significant alteration in the appearance has developed after seven months of normal activity of the patient. No untoward sequelæ have followed implantation of the tantalum powder. Histopathological study, in one case, of tissue removed six weeks after implantation of the powder, showed only mild reactive changes. R. C. BURR

Depth Dose Measurements at 400 Kilovolts. Jacobson, L. E.: *Radiology*, **44**: 273, 1945.

Curves and tables showing depth doses for 400 kv., hvl. 4 mm. Cu, in a pressed wood phantom of 1.05 gm./c.c. density, are given for different fields.

Curves showing depth doses obtained in the same manner for 200 kv. are plotted on the same graph for comparison with 400 kv.

A table showing the data obtained by different investigators for depth doses at 400 kv. is given. R. C. BURR

Anæsthesia

Nitrous Oxide in Army Hospitals. McCarthy, K. C.: *Anæsthesia & Analgesia*, **24**: 45, 1945.

In army installations, certain drugs are "standard" and others are prohibited or unobtainable. In the United States Army, cyclopropane is among the latter. Nitrous oxide is the only gaseous anæsthetic adopted by the Army. As an anæsthetic agent it possesses many desirable properties. It is non-irritating, relatively odourless, and rapidly absorbed by the tissues with prompt recovery from anæsthesia and minimal nausea and vomiting. Postoperative pulmonary complications are rare and there is no upset in metabolism provided adequate oxygenation is maintained.

For minor operations requiring relatively little relaxation, it is ideal. However for deeper degrees of anæsthesia and relaxation, its unsupported use is usually associated with deprivation of oxygen. If this is avoided by adding ether to the nitrous oxide, much of its desirability as a pleasant, non-irritating anæsthetic agent is lost and additional disadvantages are imposed. This state of affairs, coupled with a lack of skillful anæsthetists and relative inexperience of recently trained technicians calls for the use of some basal or supportive anæsthetic agent in order that nitrous oxide may be employed without ether and without dangerously low oxygen concentrations.

This problem has been met by the use of a preliminary injection of sufficient 2½% pentothal solution to produce light anæsthesia. It is unusual to exceed 500 mgm. (or half the usual ampoule of 1 gram contents). An oral airway is introduced and the anæsthesia continued with nitrous oxide and oxygen. In most cases no additional pentothal is necessary; the basal dose is completely metabolized during the anæsthetic period and the recovery is comparable to that following nitrous oxide anæsthesia.

If the operation is prolonged, or more muscular relaxation is required, additional 2½% pentothal solution is added during the anæsthesia. Apparatus for its intermittent administration is illustrated and described. The use of pentothal has overcome the disadvantage of unsupported nitrous oxide, *i.e.*, difficulty of administration and lack of potency. Its use is a great boon to unskilled administrators of this anæsthetic agent, nitrous oxide.

Sodium pentothal alone as the principal agent is not recommended for prolonged or major operations. Its use should be incidental and complementary to nitrous oxide in these cases. F. ARTHUR H. WILKINSON

Hygiene and Public Health

Rheumatic Fever in Cincinnati in Relation to Rentals, Crowding, Density of Population, and Negroes. Wedum, A. G. and Wedum, B. G.: *Am. J. Pub. Health,* **34:** 1065, 1944.

Among 3,475 admission for rheumatic conditions to the various hospitals in Cincinnati during the 11 year period 1930 to 1940, 517 persons with a listing of rheumatic fever with or without heart disease or chorea were studied with respect to economic condition (median monthly rental), crowding (persons per room), colour, and density of population (persons per habitable acre). Some of the findings are incorporated in the following table:

Characteristics of census tracts	Annual cases rheumatic fever per 100,000 population in each census tract (C.T.)		N=1 (χ^2)
	10 cases or more (C.T.)	Less than 10 cases (C.T.)	
Rentals less $21.65 monthly ..	25	1	
Rentals $21.65 or more	8	69	61.8
Crowding* 11% or more	25	6	
Crowding less than 11%	8	64	45.0
Persons per acre 23 or more .	30	19	
Persons per acre less than 23	3	51	34.1
Negroes 6% or more	16	6	
Negroes less than 6%	17	64	19.0

* 1.51 or more persons per room.

According to the χ^2 test, where N=1, a χ^2 between 3.5 and 4 means that the association could occur by chance alone 5 times in 100. Any larger χ^2 is considered significant. FRANK G. PEDLEY

The Maternity Hospitalization Act of Alberta 1944. Bow, M. R.: *Canad. J. Pub. Health,* **35:** 461, 1944.

Under the Maternity Hospitalization Act of Alberta 1944 "Any woman: (*a*) who has been a resident of the Province for 12 consecutive months out of the 24 months immediately preceding her admission to a hospital as a patient under the provisions of the Act, and who is so resident at the time of her admission and whose hospitalization is not a responsibility of the Dominion Government; or (b) who, by reason of circumstances arising out of the war, or by reason of other exceptional circumstances, is declared by regulations made hereunder to be entitled to the Act, although not coming within the requirements of the above-mentioned Section A, shall be entitled to free hospitalization for herself and her newborn infant or infants for a maximum period of 12 days, and shall be entitled to all public ward maternity service of the hospital."

"The Act provides that nothing shall prevent a hospital making an arrangement with any person for the maternity hospitalization of any woman in a semi-private or private ward, but in any such case there shall be no liability on the Minister with respect to the extra costs of hospitalization in a semi-private or private ward, over and above the public ward maternity charges."

An appraisal schedule has been elaborated for the purpose of assessing the maternity facilities available in various hospitals. Hospitals have been classified into six main groups. The payment ranges from $2.10 to $3.60 per patient per day and in addition the Health Department pays each hospital a grant of 45 cents per day for the mother and 45 cents a day for each child.

FRANK G. PEDLEY

Industrial Medicine

The Industrial Nurse and the Woman Worker. Mohr, J., United States Department of Labour, Women's Bureau, Special Bulletin No. 19, 1944.

The nurse's responsibility is analyzed, and comprises the giving of assistance in solving the problems that confront the workers and educates them in matters of health and safety. It is of vital importance that the nurse be informed as to working conditions, actual and desirable; occupational hazards and accident prevention; plant service and food facilities; the personal problems that lower women's efficiency on the job; and other developments of the war years.

Personal and plant factors that contribute to good or bad health, both on and off the job, are discussed in detail. The problem of fatigue is very important. Fatigue is not a simple element but rather, a group of conditions both within the worker and in the environment. Some of the factors that might create it are: long hours of work, posture, home responsibilities, monotony, physical environment, night work and personality factors.

The nurse must be equipped to help the newcomers appreciate the importance of nutrition, personal hygiene, health in the home, mental hygiene, and the hazards that may be encountered on the job and the essential safety practices. Health propaganda may be disseminated through plant papers, leaflets, posters, pamphlets and films.

In addition to presenting the above aspects of the nurse's work, the report shows the importance to a plant of a planned program for health and safety and indicates the main points at which the nurse can contribute. It stresses her co-operation with the department heads, health and safety committees, and with community resources. One of the most useful sources of aid and information is the industrial nursing consultant in the industrial hygiene division of the local department of public health or department of labour. About half the States have such a service. MARGARET H. WILTON

The Significance of Anæmia Among Women Factory Workers. Barrie, H. J.: *Industrial Welfare & Personnel Management,* **26:** 184, 1944.

That 8% of women factory employees need iron treatment and that from 1 to 2% are seriously ill from iron deficiency anæmia were the conclusions reached after these investigations. That women do not have alarming symptoms and hence do not visit their doctors was found to be the main reason. A secondary is the scarcity of medical services at the present time.

The commonest cause of true anæmia is iron deficiency, which may result from insufficient iron in the diet, inability to absorb iron from the gut, or from

continued loss of blood from the body. In women these causes tend to overlap. Pallor due to anæmia is caused by an insufficient quantity of hæmoglobin.

The findings of an investigation conducted for the Medical Research Council and involving hæmoglobin estimations on groups of women factory workers were confirmed by those of a further study as reported by the author. The latter study also included the possibility of eliminating anæmia in factory workers. In it, the women found to have a hæmoglobin value below 90% were given treatment in the form of tablets of iron sulphate for a period of four weeks, after which time they were retested.

The author classifies the women clinically as follows: those in the group 81 to 95% as having lowered reserve, in the group 61 to 80% as being definitely pathological and therefore chronic invalids, and in the group 60% and below as being really sick women. Ninety per cent was taken as the lowest limit of normal.

In the relationship of anæmia to age where two peaks, the age period 16 to 20 and 41 to 45. This fits in well with clinical knowledge of the incidence of anæmia.

When the anæmic women were retested after four weeks' iron treatment it was seen that the average response to treatment was inversely proportional to the initial level of hæmoglobin. Slightly more than 50% showed a normal hæmoglobin percentage and felt definitely improved, chiefly in respect to more energy and better appetite. About 8% did not tolerate this medication well. They complained of nausea, headache, constipation and diarrhœa. In the author's opinion these results confirmed the rôle of iron deficiency in the cause of anæmia. Those persons who failed to show improvement were probably anæmic from other causes than iron deficiency.

MARGARET H. WILTON

Obituaries

Medical Officers killed in action or died on active service overseas, reported in April:

Captain MacLOGHLIN, Edward Gregg, Hamilton, Ont.

Major WILLIS, Eric Albert, Kitchener, Ont.

Major TANTON, Gerald Pope, Port Dufferin, N.S.

Died in Canada:

Lieutenant Colonel STRINGER, Frederick Herschel, Vancouver, B.C.

Dr. Forrest B. Leeder was born at Swansea, South Wales, in 1865. He was educated at Swansea Grammar School and at Crawford College at Maidenhead near London. Later he was a student at St. Mary Hall, Oxford, before taking his medical training at University College, London. While practicing in Sussex, he met his wife, Edith, eldest daughter of Dr. S. Wilson Hope. Following his marriage, he practiced at Leamington Spa, Warwick and after some years, moved to Parmston, Dorset.

Needing a rest he made a holiday trip to Victoria and like so many others he could not forget Victoria after his return home, with the result that he came here and settled in 1908. For some years he was associated with Dr. O. M. Jones and later practiced independently. He was active in his profession until within three years of his death when he retired on account of illness.

Such is a brief epitome of fifty years of active medical practice. His professional attainments are attested by his associates. In addition to his work he found time to act as examiner for the College of Physicians and Surgeons of the Province of British Columbia; was a Director of The Royal Jubilee Hospital and President of the Victoria Medical Society. His work was nationally recognized by his appointment as President of the Canadian Medical Association in 1926.

Dr. Leeder had, however, many interests in life. He had as a background for his profession a broad education which enabled him to enjoy his library, his garden and his extensive collection of the accessories of gracious living—paintings, china, furniture, rugs of bygone days. All were dear to him and when he discussed them he spoke with knowledge as well as affection. He was an accomplished pianist and with his wife, a talented violinist, he was especially interested and at home in chamber music.

Dr. Leeder had a rare gift of wit and enjoyed a clever, well turned phrase. In many of his best stories he was the butt of the dénouement and while he never spoiled a good story by too hasty narration he equally well avoided drawing it out into a Canterbury tale taxing the patience of his listeners.

Dr. Leeder carried with him throughout life something of the leisurely approach to living that we like to think was characteristic of the later years of the last century. He lived a full life and enjoyed it and was contented with it, so that when he gave up active practice he was able to say cheerfully—"It is all right; I have had a good inning." We shall all miss him. H. H. MURPHY

The Late Dr. L. J. Austin

AN APPRECIATION

May I add something to what was said in the May issue about my friend and colleague of twenty-five years —John Austin? We often say about an outstanding personality that after so and so was cast nature broke the mould. Of no one I have ever met is that more true than of our late friend. He was unique and not in one respect only but in many. Probably his outstanding characteristic was his friendliness. This friendliness extended to all and sundry. All his pupils were his friends and therefore John Austin's friends are to be found the length and breadth of Canada. Indeed, at the present moment, they are scattered over the world, on sea and land. Another of his outstanding characters was his wit and humour which in his case went together. Wherever he sat at some festive board there was laughter and merriment. He had an extraordinarily agile mind and a retentive memory. He had apt anecdotes to fit all occasions. He was not a finished public speaker because he never prepared but he was always interesting and amusing. He had read widely and in some directions profoundly. He could talk with authority upon such widely diverse subjects as the great Napoleon, the diseases of the Kings of France, the Siege of Malta and the first appearance of syphilis in Europe.

As a teacher he was unsurpassed. Give him a blackboard and chalks and he would talk by the hour apparently without preparation on some small but important surgical matter, illustrating his points with beautifully executed anatomical drawings.

It is beyond my province to place him as a surgeon but my impression is that he was a good all-round operator, at his best with injuries and infections and not greatly dependent upon the latest instruments or skilled assistance. He was in his element in the War of 1914-18, saving lives and limbs with his experience, his anatomical knowledge and his resource. His apprenticeship at the London Hospital stood him in good stead and he was a worthy son of his school and his university.

No mention of John Austin would be complete without reference to his love for little children. When I arrived in Kingston with my family he was our first visitor. He bustled into the sitting room, sat down, took a child upon his knee and said "I'm uncle". And

uncle he remained to the end of the chapter. Needless to say the affection was reciprocated by the junior members of the rising generation.

He had a robust outlook upon life and perhaps his faith might be summarized in the words of R.L.S.

"Glad did I live and gladly die,
And I laid me down with a will."

We may have criticized him and questioned some of his habits and his lack of dignity but all those who really knew the man gave him their affection.

JAMES MILLER

Dr. Harry W. Blakely, formerly of Thomasburg and Belleville, Ont., died after a brief illness in the Military Hospital at Kingston, on March 31. For the past three years he served in the Royal Canadian Army Medical Corps in which he held the rank of major and was stationed at the Military Hospital, Kingston.

The late Dr. Blakely, who was in his 39th year, was born at Thomasburg, and was a son of Mr. Henry Blakely and the late Mrs. Blakely. He received his education at the village school, Tweed High School and Queen's University, Kingston from which institution he graduated in medicine in 1931 and later took a postgraduate course in surgery at White Plains, N.Y. For four years he practised in Foxboro, having taken over the practice of the late Dr. Ward. Later he commenced practice in Kingston and was engaged in his profession there for three years prior to accepting duties with the Royal Canadian Army Medical Corps.

The announcement of the death of Dr. Blakely will bring sincere feeling of regret to a host of friends in his native village, the surrounding district and in this city. For a time during his student days he was engaged in the offices of the Canadian National Railways here during the long vacation. He was much interested in sports and played shortstop with the National baseball team here when that team won the Ontario senior baseball title in 1928 from the Walkerville Chicks.

Dr. Blakely had made much progress in his profession and his future seemed bright; he possessed many fine traits of character and he was popular and highly regarded by his associates in and outside of his profession. He was a member of the United Church.

Surviving are his wife, the former Miss Dorothy Boyle; one daughter, Dorothy and one son, David; his father, Mr. Henry Blakely, of Thomasburg; one sister, Mrs. Gerald Reid, and one brother, Mr. Murney Blakely, both of Thomasburg.

Dr. Harold Cameron. The death occurred at River John, Pictou County, of Dr. Cameron on April 10, after a long period of illness. He was the son of the late Dr. J. J. Cameron of River John. His early education was received at Pictou Academy. He graduated in medicine from Dalhousie University in 1901. At various times he practised at Thorburn and Maccan in Nova Scotia and at Le Pas, Manitoba.

Surviving are three brothers, Dr. O. H. Cameron, River John, Ernest Cameron, Wolfville and G. A. Cameron of Waverley, Mass. Miss Annie E. Cameron, Halifax, and Mrs. A. W. Sutherland, of River John, are sisters.

Dr. Robert Douglas Cameron, aged 36, son of Wellington A. Cameron, Warren Road, and the late Elizabeth Jaffray Cameron, died April 8 at Drumheller, Alta. Since his graduation in medicine from the University of Alberta, he was connected with the Drumheller association of physicians which provides medical and surgical service to the miners of the district.

Dr. Cameron, a grandson of the late Senator Robert Jaffray, was born in Toronto, attended Model School, Upper Canada College, Royal Military College, Kingston; Pickering College, Victoria University and the Ohio State University before entering the University of Alberta. He was a former member of Deer Park United Church. Surviving also are his widow; two sons, Robert and Bruce; a daughter, Elizabeth Anne, Alberta, and a brother, J. Wilfred Cameron and a sister, Mrs. James Linney, Toronto.

Dr. Alexander H. Campbell, aged 66, eye, ear, nose and throat specialist of Saskatoon for 27 years prior to his retirement last fall, died May 5 at his residence, 622 University Drive. In addition to his active interest in many civic and professional organizations, his chief hobby had been farming. For many years he operated a noted Holstein dairy at Clark's Crossing. Of late years he and his son, Archie, had developed one of the Saskatoon district's most outstanding fox and mink ranches. In addition, he had carried out many experiments in the propagation of varieties of fruit trees suitable for this region.

Born at Ailsa Craig, Ontario, Doctor Campbell graduated in medicine from University of Toronto in 1904, and practiced at Elmvale and Hespeler, Ontario. Following postgraduate studies at the University of Edinburgh, and later at New York and Chicago, he practiced in Saskatoon for 27 years.

During his residence there he had been a member of Knox United Church, and of its session since 1924.

He is survived by his widow and son, Archie, recently returned from England where he served with the R.C.A.F., also three sisters, Joan, and Charlotte, Ailsa Craig, and Margaret, Medicine Hat, and a brother, Archie, Ailsa Craig.

H. D. HART

Dr. P. McF. Carter, aged 67, one of Sydney's best known physicians, died on April 4 at his home on North Charlotte Street. He had been in poor health for some time but was able to be about daily. His death will be mourned by a wide circle of friends, associates and patients whom he had served faithfully since he began practice 36 years ago.

Dr. Carter was born in Antigonish and was a graduate of St. Francis Xavier University. His medical studies were carried out at Dalhousie University where he graduated in 1909 and came to Sydney to practice.

He taught school for a time at Reserve Mines before entering medical college and conducted a pharmacy on Charlotte Street.

He was a fourth degree member of the Knights of Columbus and was connected with the Cape Breton Medical Society, the medical staff of St. Rita's Hospital and the Nova Scotia Medical Society.

Besides his widow he is survived by several children, sisters and brothers.

Dr. Albert M. Clark, aged 76, a medical practitioner in Toronto for 35 years, died on April 12. Dr. Clark graduated from the University of Toronto and took postgraduate work in New York. He practised in Canboro and Dunnville before coming to Toronto. Dr. Clark was a Mason and a past master of the lodge. He belonged to the Academy of Medicine and attended St. Barnabas' Anglican Church. Surviving is a son, A. C. Clark.

Dr. Frederick Middleton Coombes passed away at his home in Hamiota after a short illness on April 3. Dr. Coombes was born in Brandon on July 27, 1885. His father operated the first store in what is now the city of Brandon. Dr. Coombes took his early schooling in Brandon then attended the University of Toronto. He graduated in 1909 as veterinary surgeon. He practiced from 1909 to 1915 in the Oak River district.

He is survived by his widow and three sons, Robert, of Flin Flon, Constable W. A. Coombes, Fort Reliance; Sergt. F. J. Coombes.

Dr. Matthew Allison Curry died at his home in Saint John in April 19, aged 88. He was born at Windsor, Nova Scotia, and graduated in medicine from the University of New York in 1883. Postgraduate studies abroad included special work in obstetrics at the

Rotunda Hospital, Dublin. In 1885 he returned to Halifax as Professor of Obstetrics and Diseases of Women at the Halifax Medical College. This position he held for upwards of 35 years.

He was personally a man of great charm, witty and highly energetic. To the students he was universally kind and his lectures rendered an otherwise dry subject dramatic and interesting. He leaves many friends.

He had a very large practice in his specialty and during the entire period of his active professional life was a member of the Staff of the Victoria General Hospital.

During the first great war he held the rank of Lieutenant-Colonel on home service. Following his retirement about 25 years ago he resided in Halifax, Bournemouth, England and latterly in Rothesay, New Brunswick. His wife, formerly Florence Alice Robertson of Saint John, a son, James of Sackville and a daughter, resident in England, survive.

Dr Charles-Arthur Desorcy. Le Dr Desorcy, du Sault-Ste-Marie, Ont., qui s'est signalé par ses multiples activités religieuses, patriotiques et sociales, dans le Nord-Ontario, et qui a aussi exercé sa profession dans deux paroisses du Bas-St-Laurent, est décédé, mars 20, à l'hôpital du Sacré-Cœur de Cartierville, à Montréal, à l'âge de 66 ans.

Né à St-Cuthbert, Berthier, Qué., il fit ses études classiques au collège de Montréal et étudia la médecine à l'université Laval de Québec.

Il exerça tout d'abord sa profession de médecin à St-Octave-de-Métis, Qué., où il demeura pendant 8 ans, de 1905 à 1912. Il fut ensuite deux ans au Bic, Qué., de 1912 à 1914. Il se rendit enfin au Sault-Ste-Marie, Ont., où il pratiqua la médecine de 1914 à 1945, et se dévoua sans relâche pour la cause catholique et canadienne-française. Il fut le fondateur de la St-Jean-Baptiste dans cette ville et en demeura le président jusqu'au mois d'octobre, alors qu'il donna sa démission, allant demeurer à Montréal pour cause de maladie.

Fils de feu le Dr Charles Desorcy et de Caroline Fiset, il épousa en 1904, à Montréal, Martha Bordia qui lui survit.

Outre son épouse, il laisse dans le deuil deux fils: et six filles.

Dr. Julius Emil Klotz, died unexpectedly on April 19, he was in his 69th year.

A son of the late Dr. Otto Julius Klotz, Chief Astronomer of Canada, and the former Maria Widemann, Dr. Klotz was born at Preston, Ont., where his father had established his home while engaged in survey work for the Dominion government. He spent his early days in that town, where he attended primary school. Later, his family moved to Ottawa and he attended Lisgar Collegiate from which he matriculated. Dr. Klotz then studied medicine at Toronto University and obtained his M.D. degree, following which he took postgraduate studies in Edinburgh, London, Paris and Vienna.

On his return to Ottawa, Dr. Klotz opened a practice, specializing in nose and throat diseases. Later he moved to Lanark and in 1914 he established himself in Westboro, where he had resided since. In Lanark Dr. Klotz held the post of coroner. Dr. Klotz was a member of the Ontario and Canadian Medical Associations.

A man of quiet and modest disposition, Dr. Klotz gained his chief enjoyment of life in the company of his family and in the cultivation of his garden. He was known as an amateur horticulturist and botanist, and in his younger days spent many happy hours searching through the Gatineau hills for interesting specimens of Canadian wild flowers and plants. The gardens surroundings his home were among the most interesting, from a botanical point of view, of any to be found in the district.

Surviving are his widow, a son, Carl Klotz, a civil engineer with the Aluminum Company of Canada at Arvida a daughter, Mrs. Skuce (Nelda), wife of Flt. Lieut. Richard Skuce, R.C.A.F., Trenton; two grandsons, and a nephew, Dr. Max O. Klotz, pathologist of the Ottawa Civic Hospital.

Dr. A. H. Logan, a brother of the late George E. Logan, of London, Ont., died March 19 at West Orange, N.J. He was born in W. Nissouri Township the second son of Mr. and Mrs. Edward C. Logan, moved to the United States about 1900, and had resided there since. He is survived by one sister, Mrs. William Dawson, of Wingham.

Dr. George Henry Lonergan died at his home in Tetreautville, on April 3, in his 63rd year. Dr. Lonergan was born at Ste. Therese and attended Ste. Therese College and Laval University. He is survived by his wife, one son, John, and two daughters.

Dr. James Angus McIntyre born at Cumberland Point, Queens County in 1859 died in the Victoria Public Hospital, Fredericton, N.B., April 14, 1945, aged 86 years.

He received his B.A., from University of New Brunswick and then taught school for several years in Saint John, after which he attended Harvard Medical School, receiving his medical degree in 1892. His first practice was in Saint John. In the First Great War he served as a captain in the R.C.A.M.C. On demobilization he moved to Fredericton Junction where he continued to practice until 1938. At this time he retired from practice and lived the last years of his life in Fredericton.

Dr. Robert Mackenzie, aged 71, died on April 17 in Vancouver.

Educated in Kirkfield public schools and Lindsay Collegiate, Dr. Mackenzie graduated in medicine from Trinity College, Toronto, and came to British Columbia 35 years ago. He was born in Kirkfield, Ontario.

He was chief surgeon for Canadian National Railways from 1898 to 1917, when he started his practice in Vancouver. He retired to Grantham's Landing some years ago.

He had belonged to the Vancouver Club, Shaughnessy Heights Golf Club and Vancouver Golf and Country Club.

He leaves his widow, one daughter, Mrs. Kenneth Bagshaw; one son, R. Lennox Mackenzie; three grandsons, all of Vancouver.

Capt. David Stewart Noble, R.C.A.M.C., was killed in action in Holland on April 22 while serving with the 11th Field Ambulance. Born in Winnipeg twenty-seven years ago, he attended Gordon Bell High School and graduated in Medicine from Manitoba University Faculty of Medicine in 1943. After serving at Camp Borden and Niagara he went overseas in January, 1944. He was the only child of Mr. and Mrs. David Noble of Winnipeg, and was well known in medical and musical circles.

Dr. Sylvester Selburne Shannon, former resident of Kingston and a graduate of Queen's University Medical School, died suddenly at Crosby, N.Y., March 28. The late Dr. Shannon was born in Kingston, December 8, 1882. He received his early education in Kingston schools and graduated from Queen's Medical School in 1906. The same year he married Edna Pearle Mooney, who predeceased him a few years ago.

Dr. Shannon's death came unexpectedly. He had gone to his office, apparently in the best of health. He was stricken with a heart attack while conversing with an associate, Dr. Smith, and died a few minutes later.

In 1907 Dr. Shannon moved to Duluth where he set up practice and in 1909 he moved to Barnum where he practised his profession until 1918, the year he located at Crosby. He was a member of the Masonic Lodge and

the Methodist Church and for many years served as deputy coroner and village health officer.

Dr. Stewart Sherwood Skinner died at his home in Saint John April 19, 1945. He was born in Saint John in 1868. Dr. Skinner's early education began in the old St. John Grammar School, continued at University of New Brunswick and his Medical Degree was obtained at Edinburgh University.

Dr. Skinner was for many years a senior physician on the staff of the Saint John General Hospital, a member of the staff and later medical director of Lancaster Hospital, D.P.N.H., until his retirement due to ill health.

His overseas service in the First Great War was extensive. In Europe he served in the front line as a regimental M.O., as second in command of No. 14 Field Ambulance and as a consultant in a Canadian General Hospital.

Among his medical appointments was that of Registrar of the New Brunswick Council of Physicians and Surgeons. He was an Anglican and a Past Master of Albion Lodge A.F. and A.M. His patients and medical colleagues will long remember Dr. Skinner for his painstaking efficiency and kindliness and his personal and professional dignity, an attribute which is sometimes lacking in the hurly-burly of present conditions.

Major Norman Skinner, a son, is serving with the R.C.A.M.C. at Camp Sussex Military Hospital.

Dr. Harold Glen Stevenson, graduate of the University of Toronto, and for the past 15 years a resident of Reading and Utica, died on May 4. He had been in poor health for some time.

Dr. Stevenson was son of the late Mr. and Mrs. A. Stevenson of Toronto and Chatham, and served as a surgeon-lieutenant in the Royal Navy during the last war. Surviving are his widow, the former Madelyn Rosamond Stretton, and two sons, Glen and William.

Surgeon-Lieut. Alan M. Vaughan. On active service for the last four years, Surgeon-Lieut. Vaughan, 29, R.C.N.V.R., was killed in action in the Pacific on Easter Sunday, his parents, Mr. and Mrs. Joseph M. Vaughan, Poplar Plains Road, Toronto, have been informed.

Surgeon-Lieut. Vaughan was flight surgeon on one of Britain's largest aircraft carriers, operating in the Far East. His duty was on deck during action, giving first treatment to wounded fliers. When assigned to carrier duty he learned to fly and took special courses in aviation and tropical medicine.

Born in Toronto, he attended Oakwood Collegiate and was associated with Timothy Eaton Memorial Church. While a student at the University of Toronto he operated a small summer camp for boys in Muskoka, known as "The Voyageurs".

Surgeon-Lieut. Vaughan was president of his year at the University of Toronto and after graduation interned in the Hospital for Sick Children and the Toronto General Hospital. He enlisted in 1941 and served first with H.M.C.S. *York* and at Halifax and *Niobe* prior to being loaned to the Royal Navy for destroyer duty aboard H.M.S. *Worcester,* which saw action in the English Channel, North Sea, Murmansk route and other waters.

Surviving besides his parents are a sister, Charmian, with the Red Cross in Italy; and two brothers, Cpl. Dennis Vaughan, now stationed in London, Eng., after service in France, Belgium and Holland; and Bryan Vaughan, in Toronto.

Dr. Hiram N. Vineburg, an outstanding gynæcologist who pioneered in that field, died May 4. Born in Russia, he was sent as a small child to join his father, a storekeeper, in Cornwall, Ont. At about 14 he ran away, started his own store, and four years later sold out his share at a sum sufficient to finance his way through McGill University medical school. He was graduated in 1878 and won the Holmes Gold Medal.

News Items

Alberta

Dr. William Frederick Gershaw, of Medicine Hat, has been called to the Canadian Senate. A graduate of the University of Manitoba in the class of 1908, he took the Alberta examinations and registered in Alberta in 1910. He is Canadian Pacific Railway surgeon and head of the Medicine Hat Clinic. He has been a member of the House of Commons for several terms and has been a worthy representative of the people.

The report of the Department of Health, Calgary, has just been issued and shows the marriage rate per 1,000 population is down to 16.1 as against the highest rate during the war period of 1942, of 22.7; but the peace time rate of 1936 was 24.5 per 1,000. Of the total number of births, 7% were illegitimate which was practically the same as 1943; 25% of all births were by mothers living outside the city.

One thousand and seventy-nine persons died during 1944, and 67.5% of these were from the following causes:

Diseases of the heart, arteries, kidneys, etc.	452
Cancer	175
Accidental deaths	41
Pneumonia	40
Tuberculosis	11
Influenza	9
All other causes	351
	1,079

The Alberta Act has been amended to give the Provincial Board of Health power over cemeteries, their location, construction, maintenance and operation; a portion to be set aside for service men, and fixing fees for burial expenses.

An experiment is on the way in the mining area west of Edmonton. Provision has been made in the Legislature looking for the establishment of a large up-to-date hospital to serve five or more mining camps, instead of each camp having a small improperly equipped hospital. It is felt as the distance from one camp to the other is so small, that a central hospital will meet all needs and at the same time give better services to the injured and ill of the area.

The Chiropractic Act establishes the Chiropractic Association as a corporation. There will be elected a Board of chiropractors, which will be the governing body, which will make all recommendations as to discipline of the members but it is left to the Lieutenant-Governor in Council, on the recommendation of the Board to cancel, or suspend the registration of a member. An action for negligence or malpractice must be brought within six months from the date when the professional services terminated.

An Act provides for the licensing of homes for the aged or infirm persons and must be a home where three or four persons are kept. Municipalities are given the power to license such homes or refuse to license them. The Minister is authorized to contribute to the support of the individuals in the home but this is limited to a sum equal to one-half that the municipality pays per individual. Provision is made for standards for such homes entitling such to grants.

G. E. LEARMONTH

British Columbia

Colonel Murray Baird, of Vancouver, has been promoted to that rank, and is now the Medical Consultant to the Canadian Army in the European Theatre of Operations.

Lieut.-Col. E. H. W. Elkington, of Victoria, is now Adviser in Ophthalmology to the Canadian Army in the United Kingdom and in the European Theatre of Operations.

Medical officers are returning from overseas, and the following are among the number: Major G. C. Johnston, who was in charge of a Field Surgical Unit in Italy, is now at the Vancouver Military Hospital. Captain N. B. Hall has been posted to the Pacific Command. Major T. K. MacLean is now in charge of the medical side, Vernon Military Hospital. Captain M. M. MacPherson is on the surgical side, Vancouver Military Hospital. Lieut.-Col. A. L. Cornish, who was O.C. of the *Lady Nelson* and later the *Letitia*, Canadian hospital ships, is posted to the Pacific Command.

Returning to private practice are: Major H. R. L. Davis, of Vancouver, and Captain W. S. Huckvale, M.C., who received wounds overseas. Dr. Huckvale will practise in Trail.

Lieut.-Col. John U. Coleman, R.C.A.M.C., formerly of Duncan, has recently been promoted from the rank of major, while serving with the Canadian Army in Italy.

Major J. E. Walker, R.C.A.M.C., well-known in Vancouver, who has been serving on the hospital ship *Letitia*, is now stationed in London, Ont.

On April 2, the new Vancouver Military Hospital opened its doors for the reception of patients. This Hospital will have 400 beds in the main hospital adjacent to Shaughnessy Hospital, and 200 beds at the Annex at the University. The Hospital is under command of Lieut.-Col. F. E. Coy. The officer in charge of the Surgical Department is Lieut.-Col. Rocke Robertson. Major C. B. Rich is in charge of Medicine, and Major Andrew Turnbull is Senior Radiologist for the radiological work in both Vancouver Military and Shaughnessy Hospitals.

The Summer School of the Vancouver Medical Association will be held from May 29 to June 1. The following are the speakers: Surgeon Commander J. W. Graham, R.C.N.V.R., St. Thomas, Ont.; Lieut.-Col. Stuart D. Gordon, R.C.A.M.C., Toronto, Ont.; Wing Commander R. C. Laird, No. 1 Air Command, R.C.A.F.; Dr. Henry Jackson, Jr., Boston, Mass.; Dr. David H. Webster, New York, N.Y.

Dr. C. H. Hankinson, of Prince Rupert, was married to Lieut. Nursing Sister Ida Edith Nelson, of Winnipeg.

Dr. N. F. Wishlow, a graduate of the University of Manitoba Medical School, is now associated with Dr. R. N. Anderson in the latter's practice at Ladner, B.C.

The arrival of the new doctor will relieve the increasing demand for more medical service locally. For over six months Dr. Anderson had been the only doctor practicing in this district, and the demands on his service have been very heavy.

Dr. Anderson has been appointed school health inspector for Delta, and will be assisted by Dr. Wishlow in this work. J. H. MACDERMOT

Manitoba

Capt. E. N. Brotman, R.C.A.M.C., has been awarded the Commander-in-Chief's certificate. The citation accompanying the award from Field Marshal Montgomery said that the award was made for outstanding service and devotion to duty during the campaign of northwest Europe.

Major Albert St.Clair Rumball, R.C.A.M.C., Brandon, has been promoted to be lieutenant-colonel.

Dr. Roper G. Cadham, late of the R.C.A.F., has been appointed assistant to Dr. Morley Lougheed, D.P.H., health officer of the city of Winnipeg.

Dr. W. J. Wood, former assistant to Dr. Lougheed has resigned and is now serving with U.N.R.R.A.

William J. T. Watt, chief of the division of communicable diseases, Winnipeg, has retired at the age of 65 after 40 years of service with the city of Winnipeg. Born in Scotland, Mr. Watt served his apprenticeship there in the drug trade. He served in the Life Guards and took part in the South African War serving as a staff officer under the late Sir Douglas Haig. After retiring from the Life Guards he took up the study of sanitary science and construction. He came to Canada in 1905. Since he took office with the Winnipeg Health department, there has been a marked decline in communicable diseases. Mr. Watt is held in high esteem by Winnipeg physicians.

Dr. D. G. Ross, who has practised in Selkirk for 47 years, has retired and will reside in Winnipeg. He was a founder of the Selkirk General Hospital opened in 1908; mayor of Selkirk from 1910 to 1916; president of the Manitoba Medical Association 1917-18; a life member of the College of Physicians and Surgeons of Manitoba from 1934 and a life member of the Winnipeg Medical Society since May, 1943. His practice has been purchased by Capt. E. Varverikos of Fort Osborne Barracks, and his wife Dr. E. Lautsch, formerly of Montreal. Dr. Ross was honoured when Selkirk physicians met at the home of Dr. Edward Johnson on April 24 and presented him with a desk reading lamp with his name engraved on a gold plate on the stand.

Lieut.-Colonel Duncan Croll, R.C.A.M.C., has recently returned to private practice after being on active service overseas since 1939. From June, 1941, he served as orthopædic surgeon to No. 5 Canadian General Hospital in England. He will be associated with the MacKinnon Orthopædic Clinic of Winnipeg. Before joining the army Dr. Croll had practised orthopædic surgery in his home city of Saskatoon.

Manitoba Medical Service had some 13,600 subscribers enrolled by April 1, 1945. The Winnipeg Firefighters' Medical Service will be merged with Manitoba Medical Service on June 1.

Flight-Lieut. David B. Stewart, R.C.A.F. overseas, has received the Diploma of the Royal College of Obstetricians and Gynæcologists.

Congratulations are being extended to Dr. J. P. Howden, who has represented the constituency of St. Boniface in the federal house for 25 years and recently has been appointed to the Senate.

Dr. P. H. McNulty, President of the Winnipeg Medical Society, was the genial host at a Welcome Home dinner to returned medical members of the armed forces and to the members of the society. The dinner was held at the Manitoba Club on April 18, and Dean A. T. Mathers, addressed the meeting on plans made by the medical schools of the Dominion for rehabilitation of medical officers in the services. ROSS MITCHELL

New Brunswick

Group Captain A. A. G. Corbet, P.M.O., Air Force Medical Services, Eastern Air Command has been reposted as D.M.S., R.C.A.F. Overseas and has left for England. Prior to his departure he was the guest of honour at a dinner meeting of his medical friends in Saint John. Dr. E. A. Petrie, President of the St. John Medical Society presided and Dr. G. B. Peat proposed the toast to the guest. Many references were made to

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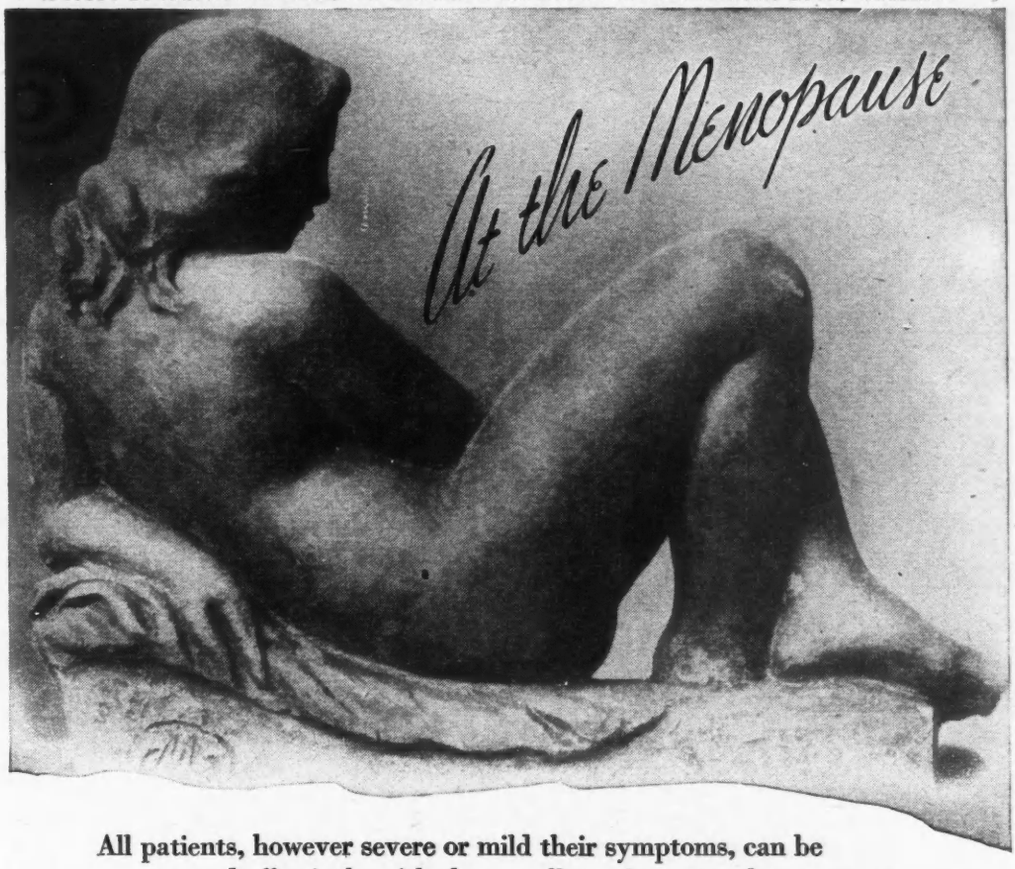

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the long service of Lieut.-Col. G. G. Corbet in the R.C.A.M.C. and the fact that this service is being continued by his son Group Capt. A. A. G. Corbet first in the R.C.A.M.C. and in this war in the Air Force Medical Service.

Dr. C. J. Veniot, of Bathurst, has been appointed to the Canadian Senate. This appointment is an honour to himself, his province and his profession. Dr. Veniot has practiced in Bathurst since his graduation from Laval and has served his country as a doctor, legislator, press agent and in every way a good citizen may. "Clarry" Veniot has served his medical societies in every capacity. President of his local and provincial medical societies and as a long time member of the Executive Committee of the C.M.A. he has always been interested in the economics of medicine and always in a practical way.

Major A. L. Richardson, R.C.A.M.C., serving in Europe has been mentioned in dispatches. His peace time location was Petitcodiac, N.B. He enlisted in September, 1940, and went overseas with No. 14 Field Ambulance.

Dr. D. J. Tonning is continuing postgraduate study at the Peter Bent Brigham Hospital in Boston.

On the occasion of his departure from Saint John to take up residence in Ontario, Dr. S. R. D. Hewitt was tendered a farewell luncheon by his medical colleagues at the Admiral Beatty Hotel. A large number of physicians attended to wish him good luck and bon voyage, and as a tangible reminder of his stay in New Brunswick, Dr. Hewitt was presented an oil painting of a local scene by a local artist of Canada-wide reputation.

Dr. J. K. Irving is resident physician at St. Joseph's Hospital, Saint John, following his discharge from the Air Force Medical Service. This appointment at St. Joseph's provides the necessary refresher work desired by service doctors previous to assuming the duties of private practice.

Dr. W. Douglas Miller, of Sussex, of the intern staff of the Saint John General Hospital won the Col. Murray MacLaren prize for 1944-45, an award made each year to the intern showing greatest improvement during the year. This prize is given in memory of the late Lieut.-Governor of New Brunswick.

Dr. A. L. Donovan read a paper on "Electrocardiography" at the April meeting of the Saint John Medical Society illustrated by a motion picture film and selected slides. The business portion of the meeting was occupied by discussion of Hospital Administration problems arising in treatment of Blue Cross and Soldiers' Dependents cases.

Dr. A. R. Myers, of Moncton, was the recipient of a framed memorial from the order of St. John of Jerusalem at a recent special meeting of the association in his home city. Dr. Myers' connection with the association and brigade has continued for many years.

Col. A. B. Walter, R.C.A.M.C., who recently parted with his gall bladder is now recovered and is enjoying convalescent leave.

A. S. KIRKLAND

Nova Scotia

In a letter recently from Dr. G. H. Cox, of New Glasgow, who has spent the winters in Florida for many years, he states that during the winter he has been employed intensively on deposits of shells of the pliocene and miocene periods. As a result, a number of specimens have been discovered hitherto unknown to science. The Smithsonian Institute, in recognizing these, have, in conformity with accepted usage, given the discoverer's name as part of their titles.

For many years Dr. Cox has been an ardent geologist and it is highly gratifying to learn that his avocation and hobby is yielding gratifying returns.

Dr. H. G. Grant, Dean of the Faculty of Medicine, Dalhousie University, recently met with a painful accident which will prevent him from carrying on his duties for some time.

H. L. SCAMMELL

Ontario

Dr. William Boyd, Professor of Pathology in the University of Toronto has been elected President of the Academy of Medicine, Toronto. Professor Boyd has given long and useful service to the Academy as a member of Council and of the Library Committee. Dr. George Boyer was elected Vice-president. In this case the honour has been earned by years of good work on Council and on the Board of Trustees.

Major W. T. Noonan has been returned for duty in Canada after having served as Registrar of Canadian General Hospital No. 23 in England. When released from service he will resume his work in the Department of Gynæcology and Obstetrics in St. Michael's Hospital, Toronto.

Capt. G. H. Ingham, Stratford, Ont., R.C.A.M.C., has been sent to Washington to study tropical medicine.

Lieut.-Col. D. E. Harvie who was in command of a Canadian hospital in Britain for the past two years has been assigned duty in Canada.

The annual meeting of the College of Physicians and Surgeons of Ontario was held in Toronto, April 11 and 12. The proposed revision of curricula in medicine in University of Toronto, University of Western Ontario and Queen's University was approved and changes in the regulations to meet the situation will be presented to the Council when it meets in November. The essence of these changes is an increase in requirements in the premedical years and a condensation of the five year medical course into four years of thirty-six weeks instead of the thirty weeks that have hitherto constituted a college year. At the close of the session Dr. John R. Stewart, of Toronto, was elected President of the College for the coming year and Dr. George Ramsay, of London, was elected Vice-president. Four new members of Council took their places. Dr. Ward Woolner, of Ayr, succeeds Dr. James McQueen who had served for sixteen years, Dr. Carl Hill, of Willowdale, takes the place of Dr. Macdougall, of Whitby, Dr. John Sparks, of Kingston, takes the place of Dr. Moir, of Peterborough, and Dr. Ian Urquhart represents the University of Toronto following Professor E. Stanley Ryerson.

Naval service headquarters recently announced the retirement of Surgeon Cmdr. J. L. Little, director of the Canadian Medical Intelligence Division, to resume his medical practice in Guelph.

He has had wide experience with tropical medicine in his capacity as superintendent of a number of hospitals in Formosa, Hong Kong and Japan prior to 1940. He joined the Royal Canadian Navy in March, 1942.

Cmdr. Little set up the medical intelligence division, to serve the three armed services in Canada, and his task took him to London and Washington, establishing channels for vital medical information.

His wife, Dr. Flora Little, has been carrying on the medical practice in Guelph during his absence.

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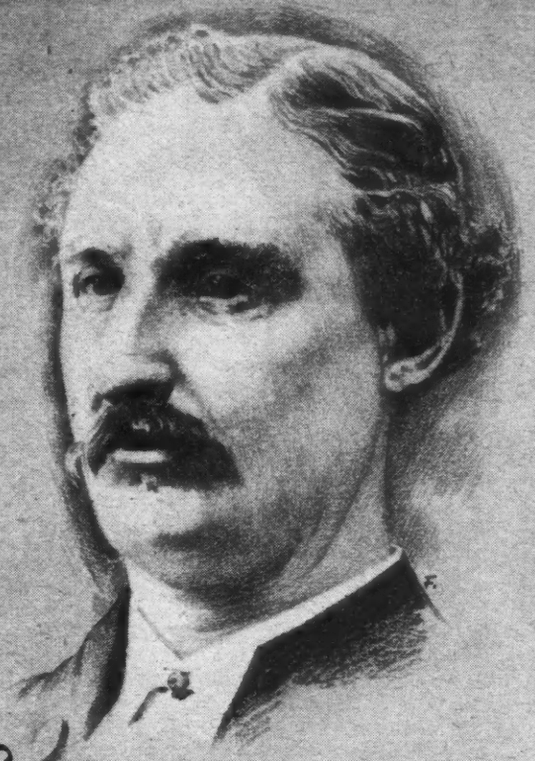

Curtis James Bird (1838-1876)

A NAME which is linked with the relief of suffering in the early days of Manitoba is that of Curtis James Bird. He was one of the first practitioners of Winnipeg and a diagnosis by Curtis Bird was recognized as accurate to a fine degree. Known as the Beau Brummel of the medical profession, he was a man of culture and refinement.

Curtis Bird was born at Marchmont House, Middlechurch, Red River Settlement. His father, James Bird, was a chief factor for the Hudson's Bay Company and a governor of Assiniboia. Curtis Bird attended St. John's College, Winnipeg, and studied medicine in Guy's Hospital, London. Upon completing the training he returned to the Bird estate at Middlechurch where he engaged in the practice of medicine. Some time later he moved to Winnipeg to continue his professional pursuits. There he took an active part in political affairs, both local and provincial.

He was a member of the Council for Assiniboia in 1868, and took part in the provincial convention which met a year later. When Manitoba became a province, he represented St. Paul's Parish in the Legislative Assembly and was made Speaker. In 1870 he was chosen a candidate for the Dominion Government.

For a number of years Curtis Bird was coroner for the District of Assiniboia, and in 1870 he was appointed to this office in the Provisional Government. While on a trip to England in 1876 he contracted pneumonia and died.

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Prince Edward Island

Dr. J. W. MacKenzie of the Polyclinic staff, Charlottetown, has returned from Boston, where he spent the past two weeks taking a refresher course under the auspices of the American College of Physicians.

Dr. and Mrs. Carleton D. Stanley, of Halifax, recently announced the engagement of their daughter, Miss Laura Katherine Stanley, to Dr. Lewis Benjamin Woolner, of Hunter River, the marriage to take place in May.

The Educational Committee of the Prince Edward Island Medical Society, of which Dr. J. C. Houston, Charlottetown, is chairman, sponsored a dinner at the Charlottetown Hotel, the evening of April 24, Dr. T. L. Farmer, Mt. Stewart, president of the Society presided. Thirty-five members were present; following dinner discussions concerning various timely topics were in order.

Dr. W. B. Howatt, Summerside, was appointed as a representative to the Prince Edward Island Association for the Control of Venereal Disease. Dr. J. P. Lantz, chairman of the Health and Welfare Committee, Reconstruction Committee, and Dr. J. A. McMillan, chairman of the Economic Committee, Prince Edward Island Medical Society, and others spoke kindly with regard to these issues.

A committee, consisting of Dr. J. W. P. McMillan, chairman, Drs. P. A. Creelman, G. L. Smith, and I. J. Yeo, Charlottetown; Dr. J. C. Simpson, Summerside, and Dr. P. McIntyre, Montague, was appointed to assist in formulating a brief to be presented to the Reconstruction Committee.

Dr. Henry W. Moyse, Bedeque, then read a most interesting and instructive paper on "Paralytic ileus", following which a vote of thanks was tendered the sponsor.

It was decided that a further meeting be held in June to coincide with the Maritime Hospital Asssociation Committee, which is being held in Charlottetown.

A. J. MURCHISON

Quebec

Le XVIIIe congrès de l'Association des Médecins de langue française de l'Amérique du Nord aura lieu à Québec les 3, 4, 5 et 6 septembre à Québec. La médecine préventive et sociale aura la place d'honneur. Les 3 sujets suivants seront traités: l'examen médical périodique, la nutrition aux différents âges et le problème de l'habitation. Le comité du congrès de compose de MM. Chs. Vézina, président; J. B. Jobin, secrétaire, et C. A. Gauthier, trésorier.

Le Dr Marcel Langlois devient titulaire du cours théorique de pédiatrie à l'Université Laval de Québec; le Dr Donat Lapointe conserve le titulariat de l'enseignement clinique de cette même spécialité. A la même université, le Dr François Roy est nommé titulaire de médecine opératoire et le Dr Fernando Hudon occupe la nouvelle chaire d'anesthésie.

Le Dr Roland Desmeules de Québec a été élu président du comité provincial de la défense contre la tuberculose.

A sa séance du 4 mars dernier, la Société médicale de Montréal a adopté une résolution dans le but d'intensifier la lutte contre l'alcoolisme.

Les Drs Fernando Hudon et de la Broquerie Fortier viennent d'être nommés chefs de service à l'Hôtel-Dieu de Québec.

A sa réunion du 8 mars dernier, la Société médicale de Valleyfield recevait le Dr Gérard Casgrain, médecin de l'Hôtel-Dieu de Montréal. Celui-ci fit une conférence sur l'allergie. La séance était présidée par le Dr Aimé Leduc.

JEAN SAUCIER

Hospital for Chronically Ill.—A 1,500 bed hospital in Montreal for the chronically ill is recommended in a report released by the Eastern Canada District of the American Association of Medical Social Workers. Help in financing the study was given by the Penfield Research Fund of the Montreal Neurological Institute, the Eastern Canada District of the American Association of Medical Social Workers, two anonymous donors, and the Metropolitan Life Insurance Company, which published the survey in French and English.

The report stipulates that the hospital should serve both French and English, be closely affiliated with McGill University and the University of Montreal, and be employed by both as a research centre into the causes and treatment of chronic illness.

Those in charge were: Chairman, Mrs. Mildred A. Lanthier; secretary, Mrs. Mary Gillean; and Mrs. Raymond Allard, Dr. Neil Feeney, Dr. Raymond Larichelliere, the late Dr. J. Norman Petersen, Antoine Desmarais, Mrs. A. Feiner, Dr. F. L. McNaughton, Mrs. Constance B. Webb, Nursing Sister Agnes Levett, R.C.A.M.C. and Surgeon Cmdr. J. Wendell McLeod, R.C.N.V.R.

The survey included 66 institutions in Montreal having beds occupied by the chronically ill. Research showed that 76% of the chronically ill were unable to finance themselves. Other statistics were: chronic patients occupy 10.9% of beds in general hospitals which cannot accommodate all the acutely ill; 21.5% of beds in convalescent hospitals and 45.2% of beds in the "so-called chronic hospitals." The survey also revealed that in institutions for the care of the aged, 70% of the inmates suffered from chronic illness.

The chronically ill fall into three categories in the report—patients who require hospital treatment; patients who stay at home but need some nursing care and an occasional visit from the doctor or consultation with a hospital outpatient clinic, and those who require care in old age institutions. Of the chronically ill studied 10.5% were under 14, 77% over 40 and 32.1% over 70.

Because chronic illness so frequently leads to dependency, the survey states that the cost of care must be met largely from public rather than private funds.

In addition to the establishment of a hospital, the survey recommends visiting physicians' service in the home and facilities through which medicine may be obtained. It notes only one visiting physicians' service to the home in Montreal. This is provided by the Health Service Division of the Child Welfare Association and limited to people cared for by Welfare Federation and to a few old age pensioners at the request of the V.O.N. when medical service can be obtained in no other way.

Reports at the annual meeting of the Montreal General Hospital on March 19, showed that the institution had been busier throughout the past year than for any other year since its foundation in 1821. There had been 12,534 admissions to the wards, and 158,336 visits to the outdoor department. In fact, the general superintendent, Dr. B. S. Johnston, showed that the wards had been occupied to 87% of their capacity "which", he said, "is really too high an occupancy if excessive demands upon the nursing staff are to be avoided, and if general maintenance and cleanliness are to be given the consideration merited".

The Treasurer's report showed a net deficit of $55,000 compared with $44,000 for 1943. Maintenance of plant and replacement of worn-out and obsolete equipment was a large item, and the matter of accommodation for the ancillary services was one of continual concern.

Miss Holt, the Lady Superintendent, commented on the difficulties encountered in obtaining adequate graduate staff owing to the continued demands of the armed forces and the growing demands for nurses with high

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qualifications. Reference was made to the appointment of Lieut.-Col. Dorothy McCrae, a graduate of the class of 1927, as matron-in-chief of the R.C.A.M.C. (Nursing Services) in Canada.

Saskatchewan

Dr. Duncan Croll has returned to private practice and has joined the Mackinnon Orthopædic Clinic at Winnipeg.

Lieutenant-Colonel Croll has been on active service since 1939 when he went overseas as regimental medical officer to the Saskatoon Light Infantry. In 1941 he was transferred to No. 5 Canadian General Hospital as orthopædic surgeon, and served with this unit in England and Sicily. He was recalled to Canada in August, 1944, for the orthopædic appointment at Shaughnessy Military Hospital, Vancouver.

His younger brother, Fl.-Lt. Ian Bruce Croll, R.C.A.F., made the supreme sacrifice in June, 1944, over enemy territory, during the invasion of Europe. H. D. HART

General

Nutrition in Newfoundland

[*An Extract from the Press Gallery Report of the House of Commons.*]

Mr. Edgar Granville asked the Under-Secretary of State for Dominion Affairs if he was satisfied that the present position of food-supplies in Newfoundland was adequate.—Mr. P. V. Emrys-Evans replied: Arrangements were made in 1943 whereby the Canadian and United States governments, in concert with the Newfoundland government, undertook to meet Newfoundland's war-time food requirements on the basis of imports in a normal pre-war year, plus 20% to allow for the increase in the war-time population. These arrangements have worked satisfactorily in general, and are combined with a rationing system covering tea, sugar, and evaporated milk. Experience has shown, however, that there is a certain lack of balance in the normal diet of large sections of the Newfoundland people. Steps, including the fortification of flour and margarine, have been taken to correct this, and to assist them in nutrition matters the Commission of Government last year invited a committee composed of dietetic experts from the United Kingdom, Canada, and United States, to undertake a survey in the island. The preliminary findings of this committee revealed that, in the limited area which they visited, many of the cases examined proved to be suffering from nutritional deficiencies. The report of the committee is now being studied by a special nutritional council which the Commission have set up. Measures are already in progress to bring home to the people of Newfoundland the benefits of a more varied diet.—From *The Lancet*, April 7, 1945.

Dr. Austin's Last Cheque.—The last cheque written by the late Dr. L. J. Austin, former professor of surgery at Queen's University, was for $50, payable to the Kingston Red Cross Society. With this amount he practically completed a mile of pennies on which he had been working since the outbreak of war.

Finney-Howell Research Foundation.—At the meeting of the Board of the Finney-Howell Research Foundation, Inc., on March 2, 1945, fellowships were renewed for Dr. Nelicia Maier for the third year; for Drs. Muriel Virginia Bradley and Margaret Aston Kelsall for the second year; and a new fellowship was awarded Dr. Elizabeth Cavert Miller, to work in the University of Wisconsin.

Applications for fellowships must be made to the office of the Finney-Howell Research Foundation, Inc., Medical and Chirurgical Faculty Building, 1211 Cathedral Street, Baltimore, Md., before December, 1945, to be eligible for consideration for 1946 awards.

Announcement has been made that Dr. Roger Y. Stanier, Director of Penicillin Production, Merck and Company Limited, Montreal, has been awarded a Guggenheim Fellowship, 1945, to work on the nature, relationships and biological activities of bacteria. Dr. Stanier was born in Victoria, B.C., October 22, 1916. He was educated at Victoria College and University of British Columbia (B.A., 1936); University of California (M.A., 1940) and Stanford University (Ph.D., 1942). He was a Rossenberg Fellow at Stanford University, 1941-42. From 1942 to 1944 he was Junior Research Biologist at the National Research Council of Canada, and since early in 1944 he has been in charge of penicillin production for Merck and Company Limited. His fields of investigation include: bacterial classification; microbial decomposition of cellulose and other polysaccharides; the myxobacteria; bacterial fermentations.

Diphtheria in Europe.—The authentic report from the health division of U.N.R.R.A. that Nazi armies carried diphtheria with them to all parts of invaded Europe is significant in that it serves to emphasize the value of toxoid and just what can happen when health services, including immunization, are disrupted or neglected. Canadian health authorities have reason for alarm over such a report.

The U.N.R.R.A. report said Norway, the Netherlands, Belgium, Northern France and Czechoslovakia suffered especially. Only Great Britain and Hungary, where immunization was pushed to the limit, escaped the scourge. Disease carriers with the Nazi armies spread diphtheria epidemics wherever they went.

The obvious moral is being demonstrated that too much effort cannot be made to carry out immunization against diphtheria in Canada.

Book Reviews

Anatomy as a Basis for Medical and Dental Practice. D. Mainland, Professor of Anatomy, Dalhousie University, Halifax. 863 pp. $7.50. P. B. Hoeber, New York, 1945.

The author's preface to this book quotes instances in which ignorance of two such important structures as the inguinal canal and the recurrent nerve persisted even in the minds of students who had had long and careful training in anatomy. Probably no complaint is heard among clinical teachers more often and perhaps with less justification for its exaggeration than that "the students don't know their anatomy". With such volumes of smoke who shall deny the possibility of combustion somewhere, but we do not believe that the whole structure of anatomical teaching has been consumed. It is even possible that the older methods —ferociously, almost sadistically, exacting as they were—did manage to impart some useful knowledge of anatomy. Those methods are not now possible, but anatomical teachers find that they have on their hands a subject which is accorded less and less time and yet still demands more and more repetition. Unless a teacher realizes that *no* method of anatomical teaching in a general medical course is alone going to make all or even a majority of anatomical facts stick in his students' memories, he will continue to be baffled. That does not mean that improvements in methods of teaching anatomy are unnecessary. On the contrary, there should be a constant search for them.

The present volume is one such attempt at improvement, by one whose sincerity of desire and enthusiasm for teaching is acknowledged to be high. But one may hazard the question whether the book will not be more interesting to those who teach than those who are supposed to learn. Professor Mainland

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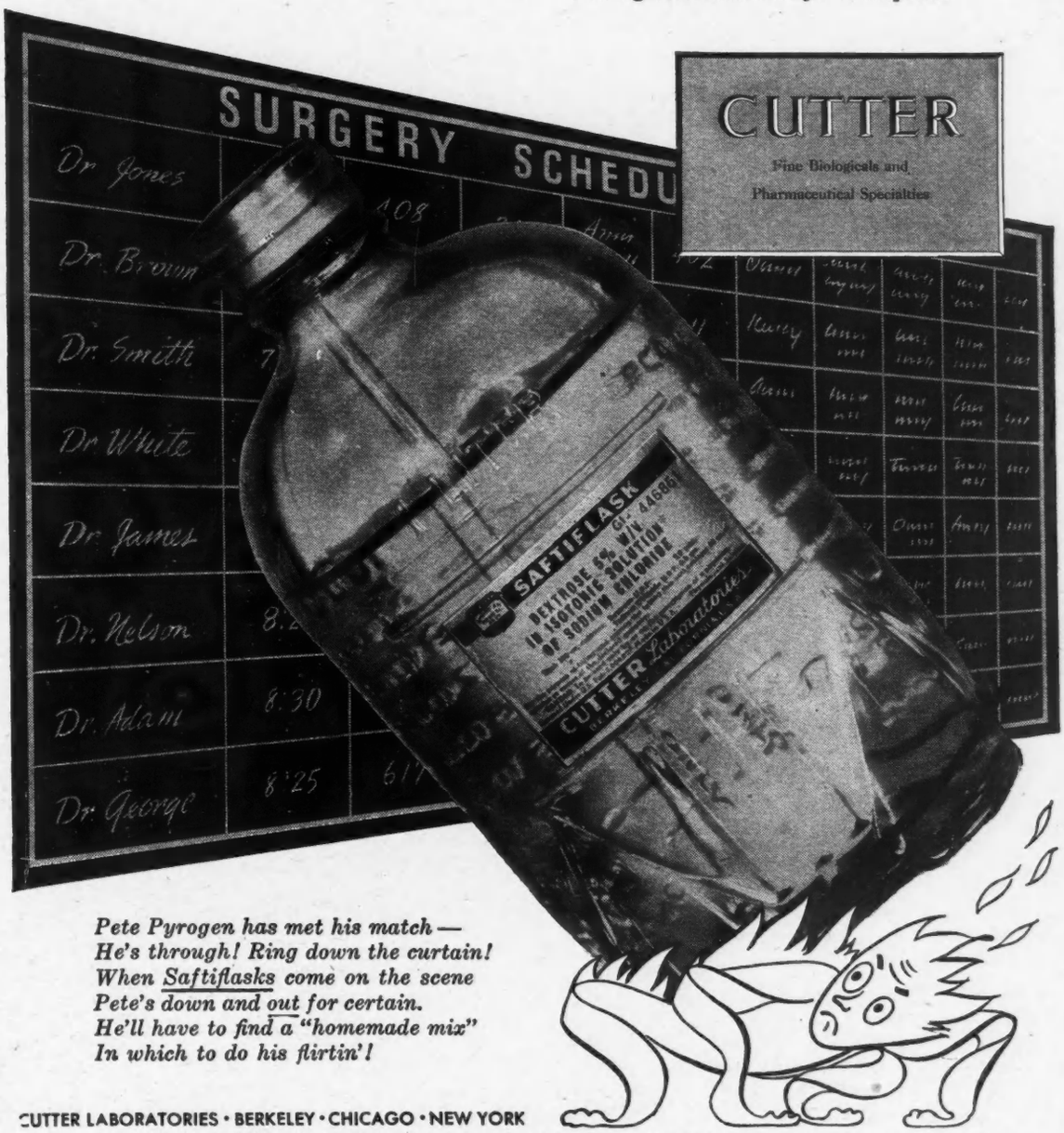

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in one of his opening sentences warns that he has not tried to make the study of anatomy easy. The warning is justified. The student who tries to learn his anatomy through these pages will find that he has also to educate himself in an ever-widening range of subjects, and the prospect will dismay a good many. And when he comes to grips, as some fine day he must do, with the plain, imperturbable facts of anatomy, the shape, size and position of structures, he will find that he must have other books to give him more details and fuller description; to say nothing of a body for dissection, the details of which are not dealt with here.

Ventures in Science of a Country Surgeon. A. E. Hertzler. 304 pp., illust. Published privately in Halstead, Kansas, 1944.

Several years ago Dr. Hertzler wrote The Horse and Buggy Doctor, a volume both interesting and amusing which was read widely by physicians and the lay public and was publicized as a unique piece of writing. The author gave vivid descriptions of the early days of his country practice in Kansas nearly half a century ago; days when travelling was often difficult and at times hazardous. His present contribution is in reality biographical and deals with the evolution of his scientific work over a period of fifty years. He has written many well known surgical and other works and these are familiar to surgeons on this continent. Having spent two years of study in Berlin working under Professors Hans Virchow, the pathologist, and Von Bergmann, the surgeon, and others, he returned to Kansas City to practice as a surgeon. In the twilight of his years, he has written this volume. Though of comparatively small dimensions, it covers a multitude of surgical subjects such as studies in the anatomy and physiology of the peritoneum, wound healing, inflammation of the peritoneum, local anæsthesia, surgical pathology, chronic appendicitis, conservative operations on the uterus and ovaries, perineal repair operations, goitres, as well as interesting chapters on the writing of books, building a library and visual education. The reading of this very interesting book has given the reviewer a great deal of pleasure, notwithstanding the fact that it is tinctured to a marked degree by the individualistic opinions of the author. This must not be considered altogether a fault for it has served to emphasize certain truths. The book is well worth reading.

The Urinary Tract: A Handbook of Roentgen Diagnosis. H. D. Kerr and C. L. Gillies, Professor and Associate Professor of Radiology, State University of Iowa College of Medicine. 320 pp., illust. $5.50. Year Book Publishers, Chicago, 1944.

This is a book, written by roentgenologists, which by a happy chance has been referred to a urologist for review. This is quite fitting as it is equally valuable to the roentgenologist and the urologist. Whether one or the other of these should play the major rôle in the interpretation of x-rays in urological cases, particularly those secured by cystoscopic procedures, there is no doubt that the best results will be obtained by a close co-operation between the two. This will permit the perfect correlation of all the clinical, laboratory and roentgenologist findings, in arriving at a final diagnosis. The necessity of such co-operation is well stressed by the authors.

Their purpose has been to produce a low-priced hand-book in which the roentgen appearance of the more common and some of the uncommon lesions of the urinary tract is made available for ready reference. The material has been derived from cases studied radiographically at the State University of Iowa Hospitals. Of the book's 320 pages, 119 pages are devoted to 475 excellent reproductions of roentgenograms.

The authors have omitted other than the most fundamental data, and have avoided lengthy discussions of the clinical and laboratory findings, limiting themselves to a brief summary of the salient points in each case, placed opposite the roentgenographic reproductions. The radiographic findings have been stressed throughout. While all portions of the book are excellent the section dealing with cystourethrographic study is worthy of special praise.

The book should prove to be a most valuable work of reference not only for radiologists and urologists but also for practitioners and students.

Radiation and Climatic Therapy of Chronic Pulmonary Diseases. Edited by E. Mayer. 393 pp., illust. $6.00. Williams & Wilkins, Baltimore; University of Toronto Press, 1944.

This book shows the unevenness due to its multiple authorship. Diverse treatments are recommended for the same disease. In addition to pulmonary tuberculosis the treatment of many other types of tuberculosis are taken up in detail.

The most interesting chapters in the book are those which give climatic data regarding the various parts of North America.

In all this is a book which will appeal to the specialist rather than to the general practitioner.

Surgery of the Hand. S. Bunnell, Honorary Member of American Academy of Orthopædic Surgeons. 734 pp., illust. $15.00. Lippincott, Montreal, 1944.

The book appropriately begins with a phylogenetic description of the hand. The result is not only absorbing reading but also provides a better understanding of the structure of the hand and its adaptation to mankind. This is followed by an excellent description of the anatomy of the normal hand including many valuable illustrations.

The main body of the book, consisting of three parts, is skilfully devoted to reconstruction of the hand; injuries and infections of the hand; and congenital, vasomotor and trophic conditions and tumours.

Part two is introduced with a description of the examination of the hand, which may seem at first a bit tedious, but it stresses the importance of accurate observation and recording of data with regard to function of a normal hand or the progress of a surgical or injured hand. The operative technique, including preoperative and postoperative care, for reconstruction of the hand is vividly related. This is followed by the method of treatment for flexion contractures from all causes, including Dupuytren's, with many illustrations.

Part three deals very comprehensively with injuries and all types of infections of the hand including burns. The chapter on "The Hand in Industry" reveals the incidence of injuries to the hand and disabilities due to accidents and stresses the importance of correct treatment and care of injuries and infections.

There can be no doubt that the profession will make great use of this book as a guide in its treatment of a difficult subject and be grateful for such a masterly contribution to the better understanding of conditions which are often problems of the greatest magnitude.

BOOKS RECEIVED

Symptoms of Visceral Disease. F. M. Pottenger, Medical Director, Pottenger Sanatorium and Clinic for Diseases of the Chest, Monrovia, Calif. 6th ed., 442 pp., illust. $5.75. Mosby, St. Louis; McAinsh, Toronto, 1944.

Correction Please. Edited by Dorothy M. Caton, Secretary of the California Historical Association. Illust. Corrective Research, 835 South Olive St., Los Angeles, Calif., 1944.

Murrell's What to do in Cases of Poisoning. H. G. Broadbridge, H.M. Coroner, County of Middlesex Western District. 15th ed., 190 pp. 8s. Lewis, London, 1944.